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BULLETIN

OF THE

TORREY BOTANICAL CLUB

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Vol. 43 No. 12

BULLETIN

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TORREY BOTANICAL CLUB

DECEMBER, 1916.

Notes on Carex—XI

KENNETH KENT MACKENZIE

CALIFORNIAN REPRESENTATIVES OF THE OVALES

During the past few years I have been favored with opportunities to examine a very considerable percentage of all collections of *Carex* heretofore made in the state of California. With the exception of specimens referable to the *Ovales*, these collections contain comparatively few plants not readily referable to species heretofore described. In the case of the *Ovales*, however, it has turned out that there are a number of undescribed species in California. In fact, most of the Californian collections in the group belong to undescribed species.

This situation arises from the fact that attempts have been made in the past to refer the Californian *Ovales* to species in the group found in the eastern portion of the United States or in the Rocky Mountain region. Similar attempts were made at one time with a number of species belonging to other groups of *Carices*, but these have gradually been corrected. In the case of the *Ovales* little has been done in this direction, and as a result a number of species are attributed to California which do not occur within a great many miles of that state.

The fact is that the species of *Carex* found in California are very largely peculiar to that state, and this is just as true in the case of the *Ovales* as in other groups.

The collections examined for the purpose of this paper were those of the University of California (abbreviated "Cal."), Leland

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Stanford, Jr., University (abbreviated "L. S."), S. B. Parish, E. Brainerd, Columbia College (abbreviated "C.") and New York Botanical Garden (abbreviated "N. Y."), and the new species described below are in these collections, as indicated, or in my own herbarium (abbreviated "K. M.").

A key covering all members of the *Ovales* known to me from California is given immediately below, and this is followed by descriptions of the new species proposed.

I. Beak of perigynium flat and serrulate to tip.
  Sheaths white-hyaline opposite blades.
    Upper sheaths (at least) strongly prolonged upward opposite point of insertion of blade, the prolongation very membranaceous. *C. specifica.*
    Sheaths not prolonged upward opposite point of insertion of blade.
      Perigynia thin with margins conspicuously wrinkled dorsally; culms 1–3.5 dm. high; spikes ovoid, densely capitate. *C. straminiformis.*
      Perigynia thick with margins not wrinkled dorsally; culms 6–9 dm. high; spikes oblong in an oblong head. *C. multicostata.*
  Sheaths green striate opposite blades, except at mouth. *C. feta.*

II. Beak of perigynium terete towards apex, the upper 1–3 mm., smooth or nearly so.
  A. Perigynia appressed, nearly or entirely covered by scales, the tips of the beaks not conspicuous in the spikes.
    Culms slender; spikes in a flexuous nodding head. *C. praticola.*
    Culms stiff; spikes approximate in an erect head.
      Culms 1–6 dm. high, the leaves not bunched near base; blades 2–3 mm. wide, flat; beak of perigynium not hyaline at orifice. *C. leporina.*
      Culms 1–3 dm. high, the leaves bunched near base; blades 1.5–2 mm. wide, more or less involute; perigynium beak hyaline at orifice.
        Perigynia oblong-ovate, rather strongly margined. *C. phaeocephala.*
        Perigynia linear-lanceolate, very narrowly margined, boat-shaped. *C. leporinella.*
  B. Upper part of perigynia conspicuous, not covered by scales.
    (*a*) Perigynia lanceolate, 5.5–8.5 mm. in length, 3–5 times as long as wide.
      Spikes about 3, not capitate; scales little more than half length of perigynia. *C. Davyi.*
      Spikes 6–12, capitate; scales equalling bodies of perigynia. *C. lancifructus.*
    (*b*) Perigynia ovate or lanceolate; if lanceolate shorter than 5.5 mm. in length.

Lower bracts leaflet-like, much exceeding head.
- Perigynia obscurely nerved ventrally, the beak ferruginous at orifice, bidentate. *C. athrostachya.*
- Perigynia strongly nerved ventrally, the beak hyaline at orifice, bidentulate. *C. tenuirostris.*

Lower bracts scale-like, much shorter than or slightly exceeding head.
- Perigynia flat, except where distended by achenes about equally in front and behind. *C. microptera.*
- Perigynia strongly plano-convex.
  - Perigynia 2.25–3.5 mm. in length.
    - Margins of perigynia entire (or very obscurely subserrulate). *C. integra.*
    - Margins of perigynia strongly serrulate.
      - Head stiff; culms stiff, smooth; leaf-blades averaging 2.5 mm. in width, light green. *C. subfusca.*
      - Head nodding; culms very slender, roughened above; leaf-blades averaging 1.5 mm. in width, deep green. *C. teneraeformis.*
  - Perigynia 3.5 mm. or more in length.
    - Perigynia beaks at tip and scales brownish or blackish tinged. *C. olympica.*
    - Perigynia beaks at tip and scales reddish or reddish-brown tinged.
      - Perigynia and scales little reddish tinged; lower bracts at least strongly amplectant. *C. amplectens.*
      - Perigynia and scales strongly reddish tinged; lower bracts not strongly amplectant.
        - (*) Perigynia with thick firm walls.
          - Perigynia strongly few- to several-nerved dorsally.
            - Perigynia nerveless or very nearly so ventrally.
              - Spikes strongly capitate; blades averaging 3 mm. wide; culms 3.5–12 dm. high. *C. sub-bracteata.*
              - Spikes not capitate, the head slender; blades averaging 1.5–2 mm. wide; culms 1–5 dm. high.
                - Culms slender; leaves not clustered, the blades 1–2 dm. long; spikes with ten to twenty perigynia. *C. gracilior.*

Culms stiff; leaves clustered, the blades short; spikes with few perigynia.	*C. paucifructus.*
Perigynia strongly nerved ventrally.	*C. Harfordii.*
Perigynia obscurely impressed striate on both faces.	*C. pachycarpa.*
(**) Perigynia with thinnish submembranaceous walls and with conspicuous raised nerves on inner face at maturity.	
Scales reddish-brown; spikes four to eight, closely aggregated.	*C. abrupta.*
Scales reddish; spikes six to twelve, the lower separate.	*C. mariposana.*

Carex multicostata sp. nov.

Cespitose, the culms 3–9 dm. high, rather stout, many-striate, bluntly triangular, smooth or slightly roughened on angles beneath head, exceeding leaves, aphyllopodic; sterile shoots not seen. Leaves with well-developed blades usually three or four to a fertile culm, on lower fourth, but not bunched, the sheaths strongly white hyaline ventrally, but not prolonged upward beyond blade; the blades flat, 2.5–6 mm. wide, usually 1–3 dm. long, not long attenuate. Head oblong, 2–4 cm. long, 1–2 cm. wide, containing about ten closely aggregated but readily distinguishable gynaecandrous oblong or oblong-ovoid spikes 8–16 mm. long, 6–8 mm. wide, rounded or short pointed at apex, the lateral rounded and the terminal short tapering at base, the twenty to thirty perigynia appressed in many rows, the tips not conspicuous, the staminate flowers inconspicuous; lowest one to several bracts slightly prolonged, the others scale-like. Scales ovate, obtuse or acute, reddish brown with lighter midvein and conspicuous white hyaline margins, narrower and shorter than perigynia. Perigynia green or in age straw-colored, ovate, 3.5–4.5 mm. long, 2–2.25 mm. wide (widest near top of achene), plano-convex, winged to the rounded base, serrulate to below middle, conspicuously many nerved on outer and several nerved on inner face, abruptly contracted into a broad, flat, bidentate, non-hyaline, tawny tipped beak 1 mm. long, winged and serrulate to the tip, the teeth erect, contiguous. Achenes lenticular, broadly oval, substipitate, 1.75 mm. long, 1.5 mm. wide, short apiculate, the style slender, at length deciduous; stigmas two.

This species is related to the eastern *Carex brevior* (Dewey)

Mackenzie, but is distinguished by the more colored scales, more strongly nerved perigynia and relatively longer perigynia beaks. It is found in the higher mountains of southern California and extends north in the Sierra Nevadas to Nevada County.

SPECIMENS EXAMINED

CALIFORNIA: Bear Valley Dam, San Bernardino County, *Parish 3609*, June, 1895 (type, in Herb. S. B. Parish); Lake Surprise, San Jacinto Mountains, 8,200 ft., *Hall 2492*, July–August, 1901 (Cal.); Truckee River Basin, Nevada County, 7,000 ft., *Davy*, June 25–30, 1897 (Cal.).

Carex leporinella sp. nov.

"*Carex tenuirostris* Olney" Bailey, Mem. Torrey Club 1: 15. 1889 (as to plant described).

Very densely cespitose from short creeping rootstocks, the culms 1.5–3 dm. high, exceeding the leaves, stiff, biennial, aphyllopodic, sharply triangular, smooth, brownish at base. Leaves with well-developed blades three to five to a fertile culm, on lower fourth and more or less bunched, the blades involute, 0.75–1.5 mm. wide, mostly 5–10 cm. long, sparingly roughened towards apex. Inflorescence consisting of three to six gynaecandrous spikes aggregated into a head or more or less separate, the head erect, rather stiff, 1.5–3 cm. long, less than 1 cm. wide, the spikes narrowly oblong-oval, 6–15 mm. long, 3–5 mm. wide, short clavate at base, short pointed at apex, the staminate flowers few, the perigynia eight to twenty, closely appressed, the tips erect-appressed; bracts scale-like, the lowest occasionally short prolonged. Scales oblong ovate, reddish-brown with lighter midvein and white hyaline margins, acute, slightly longer and wider than and concealing perigynia. Perigynia narrowly lanceolate, widest near middle of achene, 4 mm. long, scarcely 1 mm. wide, strongly plano-convex, very narrowly margined, serrulate above middle, finely striate dorsally, at first nerveless ventrally, at maturity few nerved, yellowish tinged, contracted and tapering at base, tapering into the short (1 mm. long), beak, which is light reddish tinged, not bidentate, hyaline at apex and obliquely cut dorsally. Achenes lenticular, oblong obovoid, 2 mm. long, less than 1 mm. wide, apiculate, the slender style at length deciduous. Stigmas two.

This species bears a close outward resemblance to *Carex phaeocephala* Piper, but is readily distinguished by the narrowly mar-

gined "boat-shaped" perigynia. *Carex tenuirostris* Olney, with which this species has been confused, is much like *Carex athrostachya* Olney in appearance, and is the plant described by Kükenthal as *Carex macloviana* var. *pachystachya* forma *involucrata* (Pflanzenreich 4^{20}: 197. 1909). Like *Carex phaeocephala* the present species is found on the higher peaks.

SPECIMENS EXAMINED

CALIFORNIA: Soda Springs of Tuolumne, *Congdon*, August 18, 1890 (Bailey); Summit Valley, Sierra Nevadas, *Pringle*, September 18, 1882 (Bailey); among summit rocks, Pyramid Peak, Eldorado County, 10,020 ft., *Hall & Chandler 4716*, August 1–2, 1903 (type, in Herb. Cal.); "Cal." (C.).

OREGON: Head of Wallowa River, 9,000 ft., *Cusack 2479*, August 17, 1900 (N. Y.).

WASHINGTON: Skamania County, *Suksdorf 5229*, August 13, 1905 (L. S.).

Carex Davyi sp. nov.

Densely cespitose, the culms 2.5–3.5 dm. high, strongly biennial, much exceeding leaves, erect but slender, sharply triangular, smooth on angles, brownish at base. Leaves with well-developed blades three to four to a fertile culm, on lower fourth, but not bunched, the blades flat or canaliculate, 1.5–2.5 mm. wide, mostly 8–12 cm. long, the sheaths strongly hyaline ventrally and fragile. Spikes mostly three, approximate in a head about 2.5 cm. long, the spikes oblong-obovoid, 12–18 mm. long, 6–8 mm. wide, rounded at apex, clavate and staminate at base, the perigynia ten to fifteen, in several to many rows, closely appressed, the beaks erect. Bracts scale-like. Scales oblong-ovate, very obtuse, chestnut with lighter center and hyaline margins, about width of but only half length of perigynia. Perigynia lanceolate, thin, green or in age straw-colored, 7.5 mm. long, 2 mm. wide, strongly many striate dorsally, less so ventrally, contracted into a substipitate base, narrowly margined from base, serrulate from middle of achene, tapering into a sharply bidentate beak, not differentiated from body, the apex and dorsal suture reddish tinged, obliquely cut dorsally at mouth. Achenes lenticular, oblong-obovoid, 2.5 mm. long, 1.25 mm. wide, substipitate, apiculate, the slender style at length deciduous. Stigmas two.

Carex petasata Dewey (*C. Liddoni* Boott), to which this species has been referred, has the perigynia practically concealed by the

scales. The leaf-blades also are noticeably wider. The present species seems to be confined to the Sierra Nevadas.

SPECIMENS EXAMINED

CALIFORNIA: In meadows along Truckee River, Placer County, *Davy 3266*, June 25–30, 1897 (type, in Herb. Cal., sheet 50814); Devil's Basin, Eldorado County, 8,300 ft., *Brainerd*, July 19, 1897 (Cal. in part); near Snowy Cascade, Eldorado County, 6,500 ft., *Brainerd 191*, July 13, 1897 (Brainerd).

Carex lancifructus sp. nov.

Culms 2.5–4.5 dm. high, stiff, erect, triangular, smooth or nearly so, much exceeding leaves, aphyllopodic, brownish at base. Leaves with well-developed blades, two to four to a fertile culm, bunched above base, the blades flat or canaliculate, thick, 2–3.5 mm. wide, mostly 7–12 cm. long, the sheaths tight, hyaline ventrally, little prolonged above blade, not readily rupturing. Head globose, 1.5–2 cm. long, and nearly as wide, the spikes six to ten, densely aggregated, gynaecandrous, oblong-ovoid, 6–9 mm. long, 4 mm. wide, tapering at both ends, the staminate flowers inconspicuous, the perigynia eight to fifteen in several ranks, appressed, the beaks not spreading. Bracts scale-like. Scales lanceolate-ovate, acute, reddish brown with lighter mid-vein and narrowly hyaline margins, about width of, but shorter than perigynia. Perigynia lanceolate, thin plano-convex, straw-colored, 6 mm. long, 1.5 mm. wide, finely several to many nerved on both faces, contracted to a substipitate base, narrowly margined (serrulate above) to base, tapering into beak one-third length of body, slender above, serrulate below, bidentate, light-reddish tipped, obliquely cut dorsally. Achenes lenticular, short-oblong, nearly 2 mm. long, 1 mm. wide, stipitate, apiculate, the slender style at length deciduous. Stigmas two.

In Californian collections this plant has been most often confused with *Carex specifica* Bailey, a species differentiated from all others of the *Ovales* by the very membranaceous texture of the sheaths opposite the leaf-blades. This thin membranaceous easily ruptured portion is also strongly prolonged upward opposite the point of insertion of the blade. *Carex lancifructus* lacks these characters, and also differs in other respects, as shown in the key published herewith. It is, in fact, most closely related to *Carex ebenea* Rydb., a species with blackish scales, although the difference in the color of the scales gives it a very different appearance.

SPECIMENS EXAMINED

CALIFORNIA: Volcano Creek, Upper Kern River, Tulare County, 7,500 ft., *Hall & Babcock 5472*, July, 1904 (type, in Herb. Cal., sheet 127,723); Little Lake, Meisner's Ranch, Eldorado County, 7,500 ft., *Brainerd*, July 17, 1897 (Cal.); Echo Lake, 7,500 ft., *Brainerd 188*, July 11, 1897 (Brainerd); mountain north of Slippery Ford, 7,500 ft., *Brainerd 191*, July 19, 1897 (Brainerd).

Carex integra sp. nov.

Very densely cespitose, the culms 1.5–3.5 dm. high, slender but erect, rather bluntly triangular, smooth, much exceeding the leaves, aphyllopodic, light brownish at base. Sterile shoots numerous, with five to eight erect leaves. Fertile culms with one or two old leaves at base and with three or four well-developed leaves just above the base, the sheaths hyaline ventrally, the blades flat, 1–2 mm. wide, 3–10 cm. long; sterile shoots with leaf-blades much longer. Spikes four to eight, densely aggregated in a head 1–2 cm. long, 6–10 mm. wide, the spikes gynaecandrous, obovoid or oblong-obovoid, 4–8 mm. long, 3.5–5 mm. wide, rounded at apex, tapering at base, the perigynia ten to twenty in several ranks, appressed or appressed-ascending. Lowest bract slightly prolonged, much shorter than head, the upper scale-like. Scales ovate, dark chestnut with prominent green midvein and in age hyaline margins, acute or short-cuspidate, nearly width of, but shorter than mature perigynia. Perigynia very small, 2.25–2.75 mm. long, 0.75–1 mm. wide, plano-convex, thickish, brownish tinged, lightly few nerved dorsally, nerveless or very obscurely nerved ventrally, lanceolate, narrowly margined to the round tapering base, tapering or somewhat contracted into a slender beak one-half to three-fourths length of body, the margins smooth (or very sparingly subserrulate under a microscope), chestnut-brown tipped with white-hyaline apex, obliquely cut dorsally. Achenes lenticular, yellowish, filling perigynia, short oblong, 1–2 mm. long, 0.6 mm. wide, short apiculate, the straight slender style at length deciduous. Stigmas two.

This species bears a strong outward resemblance to *Carex subfusca* W. Boott. It is well distinguished, however, by the very small, narrow perigynia, and especially by the margins of body and beak being smooth.

SPECIMENS EXAMINED

CALIFORNIA: Summit, Placer County, 7,000 feet, *Heller 9841*, July 16, 1909 (type, in Herb. K.M.); Jason & Stewart's Camp, headwaters of Hat Creek, Shasta County, 2,120 m., *Eggleston 7380, 7430*, July 31, 1911 (K.M.); meadow near Stoneman Bridge, Yosemite Valley, *Abrams 4399*, July 19, 1911 (K.M.); trail to Slippery Ford, Eldorado County, *Brainerd 216*, July 10, 1897 (Brainerd); above Slippery Ford, Eldorado County, *Brainerd 205* in part, July 15, 1897 (Brainerd).

OREGON: West slope of Three Sisters, 5,000 ft., *M. E. Peck 72*, July 19, 1914 (K.M.).

Carex teneraeformis sp. nov.

Cespitose, the culms 3–4.5 dm. high, erect, very slender, triangular, smooth or nearly so on angles, exceeding leaves, aphyllopodic, light brownish at base. Sterile shoots conspicuous with four to six erect leaves. Fertile culms normally making growth in one year, with three to four leaves on lower fourth, but not bunched, the sheaths strongly hyaline ventrally, the blades flat or with slightly revolute margins, 1.5 mm. wide, usually 6–18 cm. long; sterile shoots with similar leaves. Spikes five to eight, readily distinguishable, ± strongly separate in a slender head, 1.5–2.5 cm. long and much narrower, the spikes gynaecandrous, 3.5–6 mm. long, 3.5–4.5 mm. wide, rounded at apex, the lateral rounded and the terminal short tapering at base, the six to twelve perigynia loosely appressed in several ranks, with rather conspicuous tips, the staminate flowers few and inconspicuous; bracts scale-like or lowest sometimes slightly prolonged. Scales ovate, acute, light brownish with lighter midvein and inconspicuous white hyaline margins, narrower and slightly shorter than perigynia. Perigynia green, ovate, widest near middle of achene, 3.25 mm. long, 1.25 mm. wide, plano-convex, thickish, winged to base, the walls submembranaceous, conspicuously several nerved on outer face, nerveless or nearly so on inner, rounded at base, serrulate above and on beak, tapering into a slender white hyaline slightly dark tipped beak, 1 mm. long, obliquely cut dorsally, the tip wingless and scarcely serrulate, the teeth strictly erect and closely contiguous. Achenes lenticular, short suborbicular, sessile, 1 mm. long, nearly 1 mm. wide, apiculate, the style slender, at length deciduous; stigmas two.

Related to *Carex subfusca* W. Boott, from which it is to be distinguished by the loose inflorescence and in general by being a

much more slender plant. It bears about the same relation to that species that *Carex tenera* Dewey does to *Carex Bebbii* Olney. The type specimen was collected "in shade of thicket" at Jonesville, Northern Butte County, at an elevation of 5,100 feet, on July 25, 1914, by Professor H. M. Hall (No. 9781), and is in my herbarium. Professor Jepson's 4374, collected July 6, 1911, at Eagle Pass, Yosemite, is to be referred here, as is probably also a young specimen collected by Bioletti near Nevada Falls, Yosemite Valley, in May, 1900.

Carex olympica sp. nov.

Densely cespitose, the rootstocks short, slender, conspicuously fibrillose covered; culms in small clumps very slender, but stiff and erect, 1.5–6 dm. high, 1–2 mm. wide at base, much exceeding leaves, roughened on angles beneath head, aphyllopodic, and light brownish at base, maturing second year, old leaves of first year's growth conspicuous. Leaves with well-developed blades, three or four to a fertile culm, inserted on lower fifth, the blades flat with slightly revolute margins, 1–2 mm. wide, 7.5–15 cm. long, light green, roughened towards apex; the sheaths hyaline opposite blades, truncate at mouth and not prolonged upward; sterile culm leaves similar. Spikes three to six, aggregated or in a slender more or less strongly interrupted head, 12–24 mm. long, 5–10 mm. wide, the spikes orbicular, 4–6 mm. in diameter, rounded at apex, rounded or the terminal one clavate at base, the perigynia eight to fifteen closely packed in several rows, ascending or in age more or less spreading, the tips conspicuous; basal staminate flowers inconspicuous, except in terminal spike; bracts scale-like or lower slightly prolonged. Scales ovate, acute or subcuspidate, at maturity chestnut brown with lighter midvein and slightly hyaline margins, as wide as but conspicuously shorter than perigynia. Perigynia narrowly to broadly ovate, thickish and strongly plano-convex, narrowly winged, the walls thickish, 3.5–5 mm. long, 1.5–2 mm. wide, greenish but soon becoming olive-brown tinged, rounded at base, several nerved on outer face, nerveless or very obscurely nerved at base on inner face, the body little serrulate, tapering into the serrulate beak half length of body, which is dark tipped, minutely bidentate, smooth and obscurely hyaline at the extreme apex, obliquely cut on convex side, the orifice not hyaline. Achenes lenticular, ovate, 1.25 mm. long, 0.75 mm. wide; stigmas two, slender, short.

The species here described is a widely distributed plant in British Columbia, Washington and Oregon, and extends as far

south as the northern part of California. It is one of the species of the *C. festiva* group with the scales dark colored at maturity, and the perigynia strongly plano-convex. In general it is most closely related to *Carex pachystachya* Cham., but it is a more slender plant with looser inflorescence and less spreading perigynia and narrower lighter-green leaf-blades. In *Carex pachystachya*, too, the culms make their growth and flower in the same year, and the white hyaline band of the leaf-sheath is very conspicuous. Another widely distributed plant of the same region is *Carex Preslii* Steud. (*Carex multimoda* Bailey). In its deep green foliage, habit of growth and leaf sheaths it closely simulates *Carex pachystachya*, but it has a looser inflorescence like the present species. From both *Carex olympica* and *Carex pachystachya* it differs in the reddish scales and reddish tipped perigynium beak, which, although slender at the top, is serrulate more nearly to the apex.

SPECIMENS EXAMINED

CALIFORNIA: Humboldt County, 3,000 ft. alt., *Tracy 3390*, July 7, 1911 (K.M.); Sisson, Siskiyou County, 3,500 ft., *Hall & Babcock 4063*, June, 1903 (Cal.).

OREGON: Meacham, *M. E. Peck 39*, July 18, 1915 (K.M.); *E. Hall 585*, 1871 (N.Y.).

WASHINGTON: Falcon Valley, Klickitat County, *Suksdorf 6254*, July 1, 1908 (K.M.); Seattle, *E. C. Smith 996*, June 12, 1890 (Piper); Bingen, *Suksdorf 2617*, June 26, 1896 (K.M.); Chiquash Mountains, *Suksdorf 3143*, September 7, 1898 (K.M.); Sequin, *J. M. Grant 701, 703, 709* in 1915 (K.M.); Olympic Mountains, *Elmer 2700*, June, 1900 (N.Y.).

BRITISH COLUMBIA: Roger's Pass, *Henry*, June 27, 1913 (Henry); Castlegar, Kootenay, *Henry*, June 14, 1914 (Henry); Carbonate, *Petersen 366*, July 16, 1904 (N. Y.); Chilliwack Valley, *Macoun 26648*, June 20, 1901 (N.Y.); Comox, *Macoun 349*, June 21, 1893 (C.).

Carex amplectens sp. nov.

Cespitose, the culms 5–8 dm. high, exceeding leaves, aphyllopodic, triangular, stiff, slightly roughened immediately beneath head, brownish at base; sterile shoots with well-developed tall culms. Leaves with well-developed blades four to six to a fertile

culm, on lower half, not bunched, the sheaths rather loose, hyaline ventrally, soon breaking, conspicuously many-striate dorsally; the blades erect, flat, 2.5–4 mm. wide, mostly 1–2 dm. long. Head 2.5–3.5 cm. long, 8–15 mm. wide, the spikes six to twelve, closely approximate or lower slightly separate, ovoid or oblong ovoid, 7–15 mm. long, about 4–5 mm. wide, short clavate and sparingly staminate at base, rounded at apex, the fifteen to thirty-five perigynia closely appressed with erect tips. Bracts conspicuous, dilated at base, closely appressed to spikes, the lower three or four usually prolonged and from nearly equalling to exceeding head, the others less prolonged. Scales ovate, acute or short cuspidate, greenish and slightly tawny tinged, the midvein prominent, somewhat narrower and shorter than perigynia. Perigynia (young) ovate, 3.5–4 mm. long, 1.75 mm. wide, rounded and contracted at base, margined, several nerved on both faces, strongly serrulate, light green, contracted into a beak one third to one half length of body, the tip slightly tawny tinged and obliquely cut dorsally. Achenes lenticular, apiculate, the slender style at length deciduous. Stigmas two.

The type specimen of this species in the herbarium of Dr. Brainerd was called to my attention by him several years ago as probably representing an undescribed species. The bracts are especially amplectant at flowering time. At maturity this character is less evident. It is a species of the Sierra Nevada Mountains.

SPECIMENS EXAMINED

CALIFORNIA: Yosemite, 4,000 ft., *Jepson 4265* in part, June 24, 1911 (K.M.); Nevada Falls, Yosemite Valley, *Bioletti*, May, 1900 (K.M.); Snow Creek Trail, Yosemite, 6,000 ft., *Jepson 4388* in part, July 8, 1911 (K.M.); Big Tree Grove, 4,788 ft., *Bolander 4978*, 1866 (Cal., Brainerd); road near Lover's Leap, Eldorado County, 5,900 ft., *Brainerd 209*, July 22, 1897 (type, in Herb. Brainerd).

Carex sub-bracteata sp. nov.

Cespitose, from short creeping tough black fibrillose rootstocks, the culms erect, 5–8 dm. high, obtusely triangular, smooth, much exceeding leaves, light brownish at base. Leaves with well-developed blades usually three to five to a fertile culm, on lower fourth, but not bunched, the blades flat, 2.5–4 mm. wide, usually 1–3 dm. long. Head globose or ovoid, 1.5–2.5 cm. long, and rather narrower, the spikes five to ten, closely aggregated, gynae-

candrous, ovoid, rounded at base, round tapering at apex, 6–10 mm. long, 4–6 mm. wide, the staminate flowers few, the perigynia ten to twenty in several to many rows, appressed or in age appressed-ascending, the beaks not spreading; one to several of lower bracts conspicuous, dilated at base, brown with hyaline margins, the tips shorter than or occasionally exceeding head. Scales ovate, obtuse or acutish, reddish brown with lighter center and hyaline margins, slightly narrower and shorter than perigynia. Perigynia dull green or soon yellowish brown, narrowly ovate, thick, plano-convex, 4 mm. long, 1.5 mm. wide, finely few nerved dorsally, nerveless or essentially so ventrally, round-tapering at base, tapering somewhat abruptly into the bidentate beak, narrowly margined (serrulate above) from base, the beak one third length of body, slender, serrulate below, chestnut tinged, obliquely cut and hyaline at apex. Achenes lenticular, thick, short oblong, 1.75 mm. long, 1.2 mm. wide, apiculate, the slender style at length deciduous. Stigmas two.

This species is closely related to *Carex gracilior*, described below, but is a much more robust plant with a more capitate head and wider leaf-blades. It is a plant of the Coast Ranges and extends from Santa Barbara County on the south to Mendocino County in the north. A specimen collected by Bolander at Oakland and in the Columbia College herbarium is taken as the type.

SPECIMENS EXAMINED

CALIFORNIA: Meadow on Russian River, Sonoma County, *Bolander 3868*, April, 1864 (Cal.); Mendocino City, *Bolander 4771*, Spring, 1866 (Cal.); *Bolander 6203* (C., Brainerd); Monterey, *Parry*, April, 1850 (C.); Oakland, *Bolander* (type, in Herb. C.); Santa Cruz, *Wood*, 1866 (C.); Lake San Andreas, San Mateo County, *Davy 763*, June 21, 1893 (C.); and *Bioletti*, June 20, 1893 (C.); San Francisco, *Jones*, May 12, 1882 (N.Y.); Crystal Springs Lake, San Mateo County, *Elmer 4429*, April, 1903 (N.Y.); *Kellogg & Harford 1065*, 1868–9 (N.Y.); Santa Barbara, *Elmer 3756*, May, 1902 (N.Y.); Comptche, Mendocino County, *McMurphy 431*, May, 1903 (N.Y., L.S.); Humboldt Bay, *Chandler 1115*, May, 1901 (L.S., N.Y.); Oakland, *Bolander*, May–June, 1862 (L.S.); "California," *Brewer* (L.S.).

Carex gracilior sp. nov.

Cespitose, but with slender short-creeping black fibrillose rootstocks, the clumps medium-sized, the culms slender, 3–6 dm. high, exceeding leaves, smooth or nearly so on angles, aphyllopodic, brownish at base. Leaves with well-developed blades three to five to a fertile culm, on lower third, but not bunched, the blades flat, 1–2 mm. wide, 5–15 cm. long. Inflorescence consisting of three to six small few-flowered spikes aggregated (or lower one or two a little separate) into a narrow or oblong head 12–20 mm. long, 5–12 mm. wide, the spikes sessile, bluntish, suborbicular, 5–8 mm. long, 4–6 mm. wide, the basal staminate flowers few and inconspicuous, the perigynia four to twelve to a spike, ascending to rather strongly spreading-ascending with conspicuous beaks; lower bract present, setaceous and from shorter than to (rarely) exceeding the head; the upper wanting or very much reduced. Scales ovate, obtusish or acutish, chestnut brown with lighter colored midrib and narrow hyaline margins, about width of, but shorter than perigynia. Perigynia plano-convex, thick, narrowly winged, 3.5–4.5 mm. long, 1.5 mm. wide, lance-ovate, dull green, the body faintly nerved dorsally, nerveless ventrally or nearly so, round tapering at base, tapering somewhat abruptly into the slender beak, one half length of body of perigynia, chestnut-brown and then hyaline at apex, obliquely cut dorsally at mouth, smooth towards apex, serrulate below. Achenes lenticular, obovate, 2 mm. long, 1.2 mm. wide, apiculate, the slender style at length deciduous; stigmas two.

Bolander's No. 3822, collected April, 1864, at Cloverdale, Sonoma County, and mounted on a sheet in the Leland Stanford University herbarium is taken as the type. This is a plant of the Coast Ranges and is found from San Francisco Bay, northward at least to Mendocino County.

SPECIMENS EXAMINED

CALIFORNIA: Mark West's Creek, *Bigelow 19* (Whipple Expedition), April 30, 1854 (C.); same station, *Bolander 3814*, April, 1864 (L.S., Cal.); Petaluma, *Bolander 4635*, Spring, 1866 (Cal.); Berkeley, *Mrs. Walker 18*, Spring, 1906 (Cal.); Sonoma, *R. Kuhn*, April 18, 1913 (K.M.); Cloverdale, Sonoma County, *Bolander 3822*, *3822-A*, April, 1864, (L.S.); Mendocino County, *Bolander 4635*, April 12, 1866 (L.S.); *Bolander & Keller*, 1872 (C.).

Carex paucifructus sp. nov.

Densely cespitose, the culms 1–2.5 dm. high, erect, stiff, sharply triangular, smooth, much exceeding leaves, aphyllopodic, brown at base. Leaves with well-developed blades two to four to a fertile culm, bunched above the base, the blades 1.5–3 mm. wide, flat or canaliculate, short, mostly 3–7 cm. long. Head ovoid or oblong, 1–2 cm. long, 6–12 mm. wide, the spikes four to eight, aggregated, gynaecandrous, ovoid, tapering at base, round-tapering at apex, 6–9 mm. long, 4.5 mm. wide, the basal staminate flowers rather conspicuous, the perigynia six to twelve, in few to several rows, appressed or appressed-ascending, the beaks not conspicuous. Lowest bract short-prolonged, much shorter than head, the others scale-like. Scales ovate, chestnut with lighter midvein and conspicuous hyaline margins, about width of, but shorter than perigynia. Perigynia dull green or soon yellowish brown, ovate, thick, strongly plano-convex, 4 mm. long, 1.5 mm. wide, nerveless ventrally, finely many nerved dorsally, round-tapering at base, tapering into the scarcely bidentate beak, margined (serrulate above) from base, the beak one third length of body, slender at tip, serrulate below, reddish tipped, obliquely cut dorsally. Achenes lenticular, short-oblong, 1.75 mm. long, over 1 mm. wide, substipitate, apiculate, the slender style at length deciduous. Stigmas two.

Dr. Brainerd's specimen cited below and in his herbarium is taken as the type of this species. Mounted on the same sheet with a duplicate of the type in the University of California collection is a specimen of *Carex Davyi* Mackenzie. The plant here described is a species of the Sierra Nevada Mountains.

SPECIMENS EXAMINED

CALIFORNIA: Devil's Basin, Eldorado County, 8,300 ft., *Brainerd 200*, July 19, 1897 (Brainerd, Cal. in part); Webber Lake, Sierra County, 6,769 ft., *Kennedy & Doten 70*, July 2, 1901 (Cal.); Sierra Nevada, *Brandegee* (N. Y.).

Carex Harfordii sp. nov.

Cespitose, the thick rootstocks short, the culms erect, stiff, 2.5–8 dm. high, obtusely triangular, smooth, much exceeding leaves, light brownish at base. Leaves with well-developed blades usually three to five to a fertile culm, on lower fourth, but not bunched, the blades flat, 2.5–4.5 mm. wide, usually 1–3 dm. long. Head globose to oblong-ovoid, 1.5–2.5 cm. long, 1–2 cm. wide,

the spikes ten to twenty, all closely aggregated, and the upper scarcely distinguishable, gynaecandrous, ovoid, rounded at base, rounded or tapering at apex, 6–10 mm. long, 4–6 mm. wide, the staminate flowers few, the perigynia ten to thirty in several to many rows, appressed-ascending or in age spreading, the beaks not conspicuous; one to several of lower bracts conspicuous, dilated and brown with hyaline margins, their tips usually shorter than or rarely little exceeding head. Scales ovate, acute, reddish brown with lighter midvein and very narrow hyaline margins, about width of and somewhat shorter than perigynia. Perigynia dull green or soon yellowish brown, narrowly ovate, thick and strongly plano-convex at maturity, 4.25 mm. long, 1.5 mm. wide, several nerved ventrally, strongly finely nerved dorsally, round-tapering to a substipitate beak, tapering into the bidentate beak, narrowly margined (serrulate above) from base, the beak one fourth length of body, slender, serrulate below, chestnut-tinged, obliquely cut dorsally and hyaline at apex. Achenes lenticular, thick, short-oblong, 2 mm. long, 1.25 mm. wide, apiculate, the slender style at length deciduous. Stigmas two.

This is a species only reported from near the coast. So far it has been found between Sonoma County on the north and Monterey County on the south. The bracts are often quite conspicuous. A specimen collected by Messrs. Kellogg and Harford (No. 1173) in 1868–9, and preserved at the New York Botanical Garden is taken as the type.

SPECIMENS EXAMINED

CALIFORNIA: *Kellogg & Harford 1073*, 1868–9 (type, in Herb. N. Y.); Pacific Grove, Monterey County, in pine woods, *Heller 6786*, May 25, 1903 (N.Y., L.S.); "In salt marsh at Fort Point, San Francisco", *Bolander 1568a*, June, 1862 (Cal.); "California" (C.); Punta de los Reyes, *Bigelow*, 1853–4 (C.); San Francisco, *Congdon*, May 3, 1881 (L.S.); Petaluma, Sonoma County, *Congdon*, May 12, 1880 (L.S.).

Carex pachycarpa sp. nov.

Carex adusta var. *congesta* W. Boott, Bot. Calif. **2**: 238. 1880.
Carex Liddoni var. *incerta* Bailey (in part), Bot. Gaz. **13**: 88. 1888.

Culms 3–6 dm. high, erect, obtusely triangular, smooth, much exceeding leaves, light brownish at base. Leaves with well-

developed blades three to four to a fertile culm, on lower fourth, but not bunched, the blades flat, 2.5–4 mm. wide, usually 1–2 dm. long. Head globose or short ovoid, 1.5–2.5 cm. long, nearly as wide, the spikes 5–8, closely aggregated, gynaecandrous, ovoid, rounded at base, round-tapering at apex, 6–10 mm. long, 6–9 mm. wide, the staminate flowers few, the perigynia ten to twenty in several to many rows, appressed, the beaks not spreading; bracts scale-like, not prolonged. Scales ovate, acute or subcuspidate, light reddish-brown, with sharply defined lighter midvein and hyaline margins, about width of, but somewhat shorter than, mature perigynia. Perigynia dull green or soon straw-colored, ovate (rather narrowly), thick and strongly plano-convex, 5 mm. long, 2 mm. wide, many-striate dorsally, very faintly many-striate ventrally, round-tapering at base, contracted into bidentate beak, narrowly margined (serrulate above) from base, the beak half length of body, serrulate below, slender, reddish-tinged, obliquely cut dorsally and hyaline at apex. Achenes lenticular, thick, light brown, short oblong, 2 mm. long, 1.5 mm. wide, substipitate, apiculate, the slender style at length deciduous. Stigmas two.

Two specimens of this species in the herbarium of the University of California are in fully mature condition and are both labeled "*Carex Liddonii*" var. *incerta* Bailey. At least two of the three specimens cited by W. Boott under his *Carex adusta* var. *congesta* belong here, and as Prof. Bailey's *Carex Liddonii* var. *incerta* is based on Boott's variety primarily, it also is to be regarded as a synonym of the present species, although the only specimen cited by him (collected by Dr. Kellogg) may belong to something else. In general appearance specimens of this species strongly resemble coarse specimens of *Carex abrupta* Mackenzie. The perigynia, however, are markedly different, as shown in the key. This is apparently an Oregon species which ranges southward in the Sierra Nevadas.

SPECIMENS EXAMINED

CALIFORNIA: Big Tree Road, Silver Valley, 8,000 ft., *Brewer 1977*, July 31, 1863 (type, in Herb. Cal., part of sheet 1060); Big Trees, 4,788 ft., *Hillebrand 2310* (Cal., mounted with type); Echo Lake, Eldorado County, 7,500 ft., *Brainerd 197*, July 11, 1897 (Brainerd); Meisner's, Eldorado County, 7,600 ft., *Brainerd 198*, July 17, 1897 (Brainerd); Dinsmore's Ranch, Humboldt County, *Tracy 4145*, June 16, 1913 (K.M.).

OREGON: Anthony Lake, Elkhorn Mountains, *M. E. Peck 1*,

August 19, 1915 (K.M.); Rock Creek Lake, Elkhorn Mountains, *M. E. Peck 31*, August 12, 1915 (K.M.); East Pine Creek, near Cornucopia, *M. E. Peck 45*, August 30, 1915 (K.M.); top of Mt. Ashland, Jackson County, *M. E. Peck 6*, July 16, 1913 (K.M.).

Carex abrupta sp. nov.

Densely cespitose, the culms 4–6 dm. high, slender but erect, triangular, smooth, much exceeding the leaves, aphyllopodic, light brownish at base. Sterile shoots less numerous than fertile, with four to six erect leaves. Fertile culms normally making growth in one year, with three or four well-developed leaves just above the base, the sheaths hyaline ventrally, the blades flat, 1.5–2.5 mm. wide, 5–15 cm. long; sterile shoots with similar leaves. Spikes four to eight, very densely aggregated in a suborbicular head 9–16 mm. long and nearly as wide, the spikes gynaecandrous, with few staminate flowers, ovoid, 5–8 mm. long, 5–6 mm. wide, rounded at base and apex, the perigynia ten to twenty in several ranks, ascending. Bracts scale-like. Scales ovate, chestnut brown with greenish center and at length hyaline margins, the midvein not conspicuous, obtuse, narrower and shorter than perigynia. Perigynia 3.75–4 mm. long, 1.5 mm. wide, plano-convex but thin-walled, soon brownish tinged with several conspicuous slender nerves on both sides, oblong-lanceolate, rather narrowly margined to the rounded base, the body serrulate on the margins above, abruptly contracted into the slender blackish-tipped beak with smooth margins and white-hyaline apex, obliquely cut dorsally. Achenes lenticular, oblong-ovoid, yellowish, substipitate, 1.8 mm. long, nearly 1 mm. wide, apiculate, the style slender straight, at length deciduous; stigmas two.

Distinguished by its abruptly beaked thin-walled strongly nerved perigynia.

SPECIMENS EXAMINED

CALIFORNIA: West Branch of North Fork of Feather River, near Sterling, Butte County, 3,000 ft., *Heller 10820*, June 7, 1913 (type, in Herb. K.M.); Hot Springs Valley near Lassen Peak, 6,000 ft., *Jepson 4101*, June 9, 1910 (K.M.); Poison Meadow, Big Arroyo, Sierra Nevada, 9,500 ft., *Jepson 1131*, August 1–12, 1900 (K.M.); Vivian Creek, San Bernardino County, 9,500 ft., *Geo. B. Grant 6403*, July 24, 1904 (Parish, K.M.); Mt. Tallac, near Lake Tahoe, 9,000 ft., *Abrams 4848*, July 29, 1911 (K.M.); Northeastern Modoc County, *Mrs. Manning 952* in part, June, 1903

(Cal.); Round Valley, San Jacinto Mountains, 9,500 ft., *Hasse*, June, 1903 (Parish); east slope of San Jacinto Peak, 9,600 ft., *F. M. Reed 2499*, July 11, 1908 (Parish); Bluff Lake, San Bernardino Mountains, *Mrs. Benton*, September, 1908 (Parish); San Jacinto Mountains, 10,800 ft., *Hall 2416*, July, 1901 (L.S.); Mt. Dana, 11,000 ft., *Bolander 5069*, 1866 (Cal.); alpine meadows along river, Truckee River Basin, Nevada County, 7,000 ft., *Davy*, June 25–30, 1897 (Cal.); Ebbett's Pass, 8,500 ft., *Brewer 2024*, August 3, 1863 (Cal.); *2075* (L.S.); Lassen's Peak, 9,000 ft., *Brewer 2178*, September 26–28, 1863 (Cal., L.S.); Echo Lake, 7,600 ft., *Brainerd 193*, July 11, 1897 (Brainerd); Mt. Goddard, 11,000 ft., *Hall & Chandler 693*, July 24–26, 1900 (L.S.); "California," 1866 (N.Y.); Soda Springs of Tuolumne, *Congdon*, August 14, 1894 (L.S.); near Bear Valley, San Bernardino County, *Abrams 2856*, August 2, 1902 (N.Y.).

OREGON: Head of East Pine Creek, *M. E. Peck 58, 59*, September 3, 1915 (K.M.); Anthony Lake, Elkhorn Mountains, *M. E. Peck 4, 5*, August 19, 1915 (K.M.); Silvies River, near mouth of Emigrant Creek, Harney County, *M. E. Peck 1*, July 9, 1912 (K.M.).

Carex mariposana Bailey, sp. nov.

Densely cespitose, the culms 2.5–6 dm. high, slender, much exceeding leaves, triangular, smooth, aphyllopodic, light brownish at base. Leaves with well-developed blades three to five to a fertile culm, on lower fourth, somewhat bunched, the blades flat, 2–3 mm. wide, usually 1–2 dm. long. Head 2–3.5 cm. long, oblong or ovoid, the spikes four to twelve, the upper closely approximate, the lower one to three slightly separate, ovoid or oblong ovoid, 8–12 mm. long, 4.5–7 mm. wide, short clavate and sparingly staminate at base, rounded at apex, the ten to twenty perigynia closely appressed with erect tips. Lower one or two bracts short prolonged, much shorter than head, the others scale-like. Scales ovate, acute, reddish with lighter center, noticeably narrower and shorter than perigynia. Perigynia deep green or in age greenish straw-colored, contrasting strongly with scales, narrowly ovate, 5 mm. long, 1.75 mm. wide, plano-convex at maturity, the walls membranaceous, strongly striate on both faces, narrowly winged, serrulate to middle, round tapering at base, tapering into slender, bidentate beak, one fourth length of body, light reddish tipped and scarcely hyaline at apex, ob-

liquely cut dorsally. Achenes lenticular, obovoid, 2 mm. long, 1.5 mm. wide, substipitate, short apiculate, the slender style at length deciduous. Stigmas two.

Professor Bailey has long had in his herbarium under the name here published, the four sheets of this species referred to below, all collected in Mariposa County by Mr. J. W. Congdon. As all of these specimens are in very poor desiccated condition, I have taken the liberty of designating as the type of this species a most excellent specimen collected by Professor W. L. Jepson in the Tuolumne Meadows, No. 4476, on the 20th of July, 1911, and in my herbarium. This species is closely related in technical characters to *Carex abrupta* Mackenzie. However, the red scales in strong contrast with the green perigynia, together with the looser inflorescence, give it quite a different aspect, especially in fresh material.

SPECIMENS EXAMINED

CALIFORNIA: Yosemite, *Bolander 6222*, Summer, 1866 (Cal.); Yosemite, 4,000 ft., *Brewer 1641*, June 17, 1863 (Cal.); Soda Springs of San Joaquin, *Congdon*, Aug. 20, 1895 (Cal.); Lake Tahoe, Bear Valley, *Kellogg* (L.S.); Summit Camp, Sierra Nevada, *Kellogg*, July 9 (L.S.); headwaters of Hat Creek, Shasta County, 2,120 m., *Eggleston 7880*, July 31, 1911 (N.Y.); Clark's ranch, on branch of Merced River, *Torrey 551*, 1865 (N.Y.); Little Lake, near Meisner's Ranch, 7,600 ft., *Brainerd*, July 17, 1897 (Brainerd); above Slippery Ford, *Brainerd 205* in part, July 13, 1897 (Brainerd); Strawberry Creek, *Brainerd 226*, July 15, 1897 (Brainerd); Yosemite Valley, *Bioletti*, 1900 (Cal.); Lake Tenaya, Yosemite, *Hall & Babcock 3639*, June, 1902 (Cal.); Tuolumne Meadows, Sierra Nevada, 8,800 ft., *Jepson 4476*, July 20, 1911 (type, in Herb. K.M.); Johnson Lake, Mariposa County, *Congdon*, August 2, 1898 (Bailey); Crescent Lake, Mariposa County, *Congdon*, August 2, 1898 (Bailey); Yosemite, *Congdon*, August 28, 1899 (Bailey); Bridal Veil Trail, Mariposa County, *Congdon*, August 3, 1898 (Bailey); Butte Mountain, Northern Butte County, *Hall 9792*, 7,000 ft., July 27, 1914 (K.M.).

A note on the structural dimorphism of sexual and tetrasporic plants of Galaxaura obtusata

MARSHALL A. HOWE

In a monograph of *Galaxaura*, a genus of calcified red algae of the family Chaetangiaceae, published by the late Professor Kjellman of Upsala in 1900,* two groups of species, denominated the "Cameratae" and the "Spissae," are recognized in the section *Dichotomaria*, the section that includes the West Indian *Galaxaura obtusata* (Ell. & Sol.) Lamour. and its allies. The plants of these two groups differ markedly and constantly in the structure of the cortex, as may be determined by a microscopic examination, particularly after decalcification. In both groups, the cortex consists essentially of three layers of cells. In the "Cameratae," the cells of the outermost or superficial layer are funnel-shaped or broadly obconic and are supported by the cylindric, clavate, or narrowly funnel-shaped, widely spaced cells of the middle layer, which, in turn, spring from the very large firmly united cells of the inmost layer; the funnel-shaped superficial cells are in contact by their edges only and they arch over large intercellular chambers, which are continuous or confluent, being bounded below by the large cells of the inmost layer and merely traversed rather than bounded by the widely spaced stalk-cells; in other words, the single superficial layer constitutes a sort of a roof or outer sheath, supported by short pillars. In the "Spissae," the cells of the outermost or superficial layer are hemispheric or saucer-shaped and are supported by the ovoid or subglobose, connivent or rather close-set cells of the middle layer, which, in turn, rest upon the large firmly united cells of the inmost layer; the intercellular spaces are comparatively small and instead of obviously extending from the superficial layer to the inmost layer they are commonly divided into two series or strata by the rounded connivent cells of the middle layer. In other words, the middle layer of the

* Kjellman, F. R. Om Floridé-slägtet *Galaxaura*, dess organografi och systematik. Kongl. Sv. Vet.-Akad. Handl. **33**[1]: 1–109. *pl. 1–26.* 1900.

cortex in the "Cameratae" consists chiefly of large obviously confluent intercellular *chambers* filled with lime, while in the "Spissae" this middle layer is made up chiefly of rounded calcified *cells*. Expressed in another way, it may be said that the two outer layers of the cortex in the "Cameratae" are filamentous, if two cells in a row (or, often, two or three cells supported capitately by a single stalk-cell) may be said to constitute a filament, while in the "Spissae," the cortex is parenchymatous or subparenchymatous throughout. In the process of decay or on teasing to pieces with needles after decalcification, it often happens that the outer cortex peels off, leaving the inner cortex still surrounding the central strand of filaments. In the "Cameratae", such a separation commonly takes place near the base of the stalk-cells constituting the middle layer, so that the two outer layers are exfoliated together, leaving the stumps of the stalk-cells protruding from the large firmly coherent cells of the inmost layer. In the "Spissae," the separation under such circumstances takes place between the two outer layers, only the single superficial layer being exfoliated, the middle layer of rounded subparenchymatous cells remaining firmly attached to the larger cells of the inmost layer.

In the course of a microscopic examination of certain specimens of *Galaxaura* from Bermuda, Florida, and the West Indies, representing forms currently referred to *G. obtusata*, it was noted that some of these specimens showed the cortex structure of the "Cameratae" group while others showed that of the "Spissae" group. It was at first supposed that two or more species were represented in this material, but it was afterwards observed that the two forms were often collected together almost throughout their range, that they showed the same or parallel variations in external characters, and that they could not be separated without a microscopic examination. A little later it was noted that whenever reproductive organs could be found (and by search they could be found in most of the specimens), the plants of the "Cameratae" structure were always tetrasporic, while those of the "Spissae" structure were always antheridial or cystocarpic. This discovery led to a careful reexamination of all the available material, with results that were confirmatory of this correlation.

One of the largest single collections at hand was that made by the writer on Condé Beach, Guantanamo Bay, Cuba, in March, 1909 (*no. 6460*), where nineteen plants or fragments of plants were picked up on the shore (the species is apparently an inhabitant of rather deep water and is found washed ashore or by dredging in 7–18 meters). Of these nineteen, three were antheridial and of the "Spissae" structure, three were cystocarpic and of the "Spissae" structure, twelve were tetrasporic and of the "Cameratae" structure, and the remaining one was apparently sterile and of the "Cameratae" structure. Of five plants dredged in 18 meters off Ratones Island near Ponce, Porto Rico (*no. 7575*), four belonged to the "Cameratae" and were tetrasporic, and one belonged to the "Spissae" and was cystocarpic. Of numerous plants or fragments dredged in 7–10 meters at the mouth of Guanica Harbor, Porto Rico (*no. 7005*), all of the thirteen examined showed the "Spissae" structure, three or four of them being evidently antheridial, one cystocarpic, and the rest apparently sterile. Of five plants found washed ashore in the harbor of Port Morant, Jamaica (*no. 6276*), two had the "Spissae" structure and were cystocarpic, while three showed the "Cameratae" structure, though tetraspores could actually be found on only one of the three. In six plants from Barbados, similar to each other in general habit, though not all collected at the same time and place, five were "Cameratae," four of them with obvious tetraspores, while the sixth showed the structure of the "Spissae" group and was cystocarpic. On the coast of Florida also, in the region of Jupiter Inlet, Indian River, and Lake Worth, in plants that are somewhat larger, coarser, and longer-segmented than the typical *Galaxaura obtusata*, the same correlations may be observed.

Finally, it is to be noted by consulting Kjellman's monograph, that all of the species that he placed in the group "Cameratae," in so far as their mode of reproduction was known to him, are tetrasporic, while of the "Spissae" the one species of which the reproductive organs are described is cystocarpic.

For complete proof that the "Cameratae" structure is a constant characteristic of the tetrasporic plants of *Galaxaura obtusata* and its allies and that the "Spissae" structure is likewise a constant character of the sexual plants, it would of course be desirable that

actual cultures should be made under control conditions as has been done by Hoyt* and by Lewis† to demonstrate the alternation of generations in certain other tetraspore-producing algae. This could be done only in tropical or subtropical waters, would probably require months for its accomplishment, and is not likely to be achieved in the immediate future. Meanwhile, however, it seems to the writer that the proof is conclusive that the suggested correlation exists, that the "Spissae" and "Cameratae" characters, first accurately pointed out by Kjellman, do not offer a proper basis for subgeneric groupings of species as supposed by him, but merely distinguish the gametophytic and sporophytic phases in the life-cycle of a single species.

It is well known that differences of habit occur between sexual and tetrasporic plants of certain red algae, as, for example, in species of *Griffithsia*, but such differences seem to be due largely to the presence of the reproductive organs themselves or to differences in the form of the cells that are rather directly concerned with their production. So far as is known to the writer of these notes, there has been no previous record of a case in which there has been alleged to exist any such constant and pronounced dimorphism in the purely vegetative microscopic structure of the sexual and tetrasporic plants in the Rhodophyceae as is here attributed to *Galaxaura obtusata*—differences that do not express themselves in general habit, but afford an easy means of distinguishing a tetrasporic from a sexual plant, even though apparently sterile.

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* Hoyt, W. D. Alternation of generations and sexuality in *Dictyota dichotoma*. Bot. Gaz. **49**: 55–57. 1910.

† Lewis, I. F. Alternation of generations in certain Florideae. Bot. Gaz. **53**: 236–242. 1912.

The flora of Ladak, Western Tibet. II. List of Ladak plants

RALPH RANDLES STEWART

The terminology employed in the present list does not always agree with the most advanced usage in North America because of the desire to make it conform to that in Hooker's Flora of British India (22). Hooker's work is likely to be used in India for years to come, and Kew standards rather than American will be followed. Where Hooker's name has been changed it is given as a synonym in parentheses.

The identifications in most cases are my own, though I have had a great deal of assistance from members of the staff at the New York Botanical Garden and from Mr. Hutchinson of Kew, who kindly determined a number of difficult specimens.

As my plants were all collected between July 17th and August 21st, it is hardly necessary to print the date of each specimen and as Hooker is careful to give altitudes, only those that differ from his or those that seem specially noteworthy are given. A list of the heights of the localities mentioned is appended, however, so that the approximate height at which individual plants grew can be found out if desired.

The following abbreviations are used: FBI, Hooker's Flora of British India (22); Hend., Henderson and Hume's Lahore to Yarkand (21); J.L.S., J. L. Stewart's Punjab Plants (34), etc.; R.R.S., R. R. Stewart. Species marked with an asterisk (*) were not found by me.

FUNARIACEAE

FUNARIA SUBMICROSTOMA C. Müll. Fotu La.

BRYACEAE

BRYUM TIBETICUM Mitt.† Sapi La.

POLYPODIACEAE

CYSTOPTERIS FRAGILIS (L.) Bernh. Common throughout.

† A second undetermined species of *Bryum* was collected at Yarungshan.

EQUISETACEAE

EQUISETUM ARVENSE L.* Dras (Hend.).

" DIFFUSUM Don. Khalotse to Yuru.

" RAMOSISSIMUM Desf. Spitug. Baker (1) says this is equally *E. elongatum* Willd. and *E. ramosum* Schk.; Henderson and Hume call their Indus Valley specimens *E. ramosum*.

PINACEAE

JUNIPERUS MACROPODA Boiss. Not rare; specimens from Himis Shukpa grove the best.

JUNIPERUS WALLICHIANA Hook. f. (*J. Pseudo-Sabina* Fisch. & Mey.). "Western Tibet" (Brandis, FBI).

JUNIPERUS COMMUNIS L.* Dras Valley (Hend.).

GNETACEAE

EPHEDRA GERARDIANA Wall. Common, very variable in height.

" INTERMEDIA Schrenk & C. A. Mey.* Zanskar (Brandis, FBI).

NAIADACEAE

POTAMOGETON PECTINATUS L. Common.

" PERFOLIATUS L. Common.

ZANNICHELLIA PALUSTRIS L.* "Western Tibet" (FBI).

JUNCAGINACEAE

TRIGLOCHIN MARITIMA L. Common.

" PALUSTRIS L. Common.

GRAMINEAE

ERIANTHUS RAVENNAE Beauv.* "Western Tibet" (FBI); probably from Skardo.

ANDROPOGON ISCHAEMUM L. Common.

PASPALUM AMBIGUUM DC.* "Western Tibet" (FBI).

PANICUM MILIACEUM L. Suru, cultivated.

SETARIA VIRIDIS (L.) Beauv. Leh, Shergol.

PENNISETUM LANATUM Klotzsch.* "Western Tibet" (FBI); probably not from Ladak.

PENNISETUM FLACCIDUM Griseb. Very common.

STIPA BARBATA Desf. (under *S. orientalis* Trin. in FBI). Tralse, Leh, Himis Shupka, Tsokar Lake.

STIPA BASIPLUMOSA Munro.* Nubra and Lanak La (FBI).

" PURPUREA Griseb.* Lake Rukshan (FBI).

" PURPUREA LONGE-ARISTATA.* "Western Tibet" (FBI).

" MONGOLICA Turcz.* Ladak (FBI).

" SIBIRICA Lam.* Dras (Hend.).

" HOOKERI Stapf.* Nubra (FBI).

" SPLENDENS Trin. Spituk, Himis Shupka.

ORYZOPSIS LATERALIS Stapf.* "Western Tibet" (FBI).

" MUNROI Stapf.* Ladak, Nubra, Zanskar (FBI).

MILIUM EFFUSUM L.*

HELEOCHLOA SCHOENOIDES (L.) Host. "Western Tibet" (FBI).

PHLEUM ALPINUM L. Suru to Sirimarg.

ALOPECURUS HIMALAICUS Hook. Rusi La.
" PRATENSIS L.* Zoji La (Hend.).
POLYPOGON MONSPELIENSIS Desf. Saspola.
AGROSTIS ALBA L. Common.
" CANINA L. Ladak (Hend.), "Western Tibet" (FBI).
CALAMAGROSTIS LITTOREA DC. Common.
" STOLICZKAI Hook.* Zanskar on Pensi La (FBI).
DEYEUXIA COMPACTA Munro.* Nubra (FBI).
" SCABRESCENS Munro.* Leh (Meebold).
AIRA CARYOPHYLLEA L.* "Western Tibet" (FBI).
DESCHAMPSIA CAESPITOSA (L.) Beauv. Rogshin.
" KOELERIOIDES Regel.* Dras (FBI).
TRISETUM SPICATUM (L.) Richter (*Avena subspicata* Clairv. in FBI). Khardong La, Rusi La.
AVENA FATUA L. Field work in Ladak.
" SATIVA L. Himis Shukpa, not cultivated.
DANTHONIA KASHMIRIANA Duthie.* "Western Tibet" (FBI).
CHLORIS VIRGATA Sw.* "Western Tibet" (FBI); doubtfully in Ladak.
PHRAGMITES COMMUNIS Trin. Spituk, Himis Shupka.
ERAGROSTIS MINOR Host. Leh.
KOELERIA CRISTATA Pers.* Dras Valley (Hend.), "Western Tibet" (FBI).
" ARGENTEA Griseb.* "Western Tibet" (FBI).
CATABROSA AQUATICA ANGUSTA Stapf.* Lanak La (FBI), Leh (Meebold).
" THOMSONI Hook.* Nubra (FBI).
MELICA CUPANI Guss.* (*M. ciliata* L. of Hend. and of Duthie). Dras (Hend.); "Western Tibet" (FBI).
BRIZA MEDIA L.* "Western Tibet" (FBI).
DACTYLIS GLOMERATA L. Dras.
SCHIZMUS MARGINATUS Beauv.* Nubra, Dras (FBI).
POA PERSICA Trin.* "Western Tibet" (FBI).
" BULBOSA L.* Zanskar (FBI).
" ALPINA L.* Ladak (Hend.), "Western Tibet" (FBI).
" TIBETICA Munro.* Ladak, saline plains (FBI).
" PRATENSIS L. Rogshin, Nyemo?
" ATTENUATA Trin. Khardong La.
" NEMORALIS LIGULATA Stapf. Rokshin, Suru, Yarungshan.
" TREMULA Stapf.* Ladak (FBI).
" ANNUA L. Yarungshan.
GLYCERIA DISTANS Wahlenb.* "Western Tibet" (FBI).
" THOMSONI Stapf.* Rupshu (FBI), Leh (Meebold).
" POAEOIDES Stapf.* Rupshu (FBI).
FESTUCA NITIDULA Stapf.* Nubra. (FBI).
" ALTAICA Trin.* Dras. (FBI).
" RUBRA L. Rogshin.
" SIBIRICA Hack.* Ladak. (FBI).
" MYUROS L.* "Western Tibet" (FBI).
BROMUS CRINITUS Boiss. & Hohen. Rachogpa.
" TECTORUM L. Namika La, Timisgam.
" PATULUS Mert. & Koch.* Ladak (Hend.).

BROMUS OXYODON Schrenk.* Dras, Zanskar (FBI).
" MACROSTACHYS Desf. Rupshu.
" BARBATUS Beauv. Tsokar Lake; common in Indus Valley.
DUTHIEA BROMOIDES Haeckel.* "Western Tibet" (FBI).
LOLIUM PERENNE L.* "Western Tibet" (FBI).
AGROPYRON LONGE-ARISTATUM Boiss. Khardong.
" JACQUEMONTII Hook.* Nubra (FBI).
" REPENS (L.) Beauv.* Ladak (FBI).
" DENTATUM ELATUM Hook. f.* Dras. (FBI).
TRITICUM VULGARE L. Cultivated in Ladak.
HORDEUM VULGARE L. Cultivated widely to about 14,000 ft. alt.
" NODOSUM L. (*H. secalinum* Schreb. in FBI). Common.
ELYMUS SIBIRICUS L. Common.
" DAHURICUS Turcz. Common.
" DASYSTACHYS Trin. Common.

CYPERACEAE

SCIRPUS PAUCIFLORUS Lightf.* "Western Tibet" (FBI).
" PUMILUS Vahl.* Skardo and Hanle (FBI).
" SETACEUS L. Timisgam.
" LACUSTRIS L.* Ladak (FBI).
" CARICIS Retz.* Leh (FBI).
" RUFUS (Huds.) Schrad. "Western Tibet" (FBI), Himis Shupka?
ELEOCHARIS PALUSTRIS (L.) R. & S. Khardong.
KOBRESIA PYGMAEA C. B. Clarke.* Ladak (FBI).
" CAPILLIFOLIA (Decne.) C. B. Clarke.* Kangi (Meebold).
" SCHOENOIDES (C. A. Mey.) Steud. Tsokar Lake, Khardong.
" ROYLEANA (Nees) Boeck.* "Western Tibet" (FBI).
" ROYLEANA KOKANICA (Regel) Kükenth.* Kangi (Meebold).
" MACRANTHA Boeck.* Nubra and Ladak (FBI).
CAREX INCURVA Lightf.* Kunawar and Kashmir to the Karakorum (FBI).
" STENOPHYLLA Wahlenb.* Piti and Kashmir to the Karakorum (FBI).
" RIGIDA Good. Khardong, Rusi La?
" VULGARIS Fries.* From Gilgit to Lahoul (FBI).
" MICROGLOCHIN Wahlenb.* Karakorum to Kunawar (FBI).
" PARVA Nees.* Deosai to Sikkim (FBI).
" NIVALIS Boott. Suru, Baralacha.
" MOORCROFTII Falc. Often common at high altitudes.
" USTULATA Wahlenb.* Karakorum to Sikkim (FBI).
" DILUTA M. Bieb.* Indus Valley (FBI).
" HAEMATOSTOMA Nees.* Nubra (FBI).
" OLIGOCARPA Schkuhr.* Dras to the Karakorum (FBI).
" HIRTELLA Drej.* Eastern Kangi (Meebold).

LEMNACEAE

LEMNA MINOR L.* "Western Tibet" (FBI).

JUNCACEAE

JUNCUS MEMBRANACEUS Royle. Rusi La, Dras, Sapi La, Suru to Sirimarg.
" SPHACELATUS Decne. Khardong La (immature and possibly *J. himalensis* Klotzsch.), East Kangi (Meebold).

JUNCUS LAMPOCARPUS Ehr.* "Western Tibet" (FBI).
" TRIGLUMIS L.* "Western Tibet" (FBI).
" HIMALENSIS Klotzsch.* "Western Tibet" to Bhotan (FBI).
" LEUCOMELAS Royle.* "Western Tibet" (FBI).

LILIACEAE

EREMURUS HIMALAICUS Baker. Near Dras.
GAGEA PERSICA Boiss. Kangi (Meebold).
ALLIUM CEPA L. Cultivated.
" SEMENOVI Regel.* Kangi (Meebold).
" SCHOENOPRASUM L. Kangi (Meebold).
" PLATYSPATHUM FALCATA Regel.* "Western Tibet" (FBI).
" JACQUEMONTI Regel.* "Western Tibet" (FBI); probably southeast of Ladak.
ALLIUM ODORUM L.* Indus Valley, Ladak (Hend.), "Western Tibet" (FBI).
" GOVANIANUM Wall.* Dras Valley (Hend).
" OREOPRASUM Schrenk.* Zalung-Karpo Pass (FBI).
" LORATUM Baker.*† "Western Tibet" (FBI).
FRITILLARIA ROYLEI Hook. Zoji to Matayan.
LLOYDIA SEROTINA Roxb. Ladak (Hend., FBI).
POLYGONATUM VERTICILLATUM All.* Dras Valley (Hend.).

IRIDACEAE

IRIS ENSATA Thunb. Common in the Indus Valley.
" KAMAONENSIS Wall.* Dras (Duthie), Ladak (Hend., J.L.S.).

ORCHIDACEAE

ORCHIS LATIFOLIA L. Zoji Matayan.
HERMINIUM MONORCHIS R. Br. Himis Shupka.
EPIPACTIS LATIFOLIA THOMSONI Hook. f.* "Western Tibet" (FBI).

SALICACEAE

POPULUS ALBA L.* To 9,200 ft. alt. in Tibet (FBI).
" EUPHRATICA Oliv.* Nubra along the Shayok (FBI).
" CANDICANS Ait. Commonly cultivated in Ladak; especially fine specimens are in the commissioner's garden at Leh.
POPULUS NIGRA ITALICA Du Roi. Commonly cultivated, especially in Leh.
" CILIATA Wall.* Leh (Meebold).
SALIX ALBA L.* Commonly cultivated.
" ELEGANS Wall.* Dras Valley near Snow (Hend.).
" SCLEROPHYLLA Anderss.* Dras (FBI).
" FRAGILIS L.* Cultivated in "Western Tibet" (Brandis).
" HASTATA L.* North side, Zoji (Hend., named *S. arbuscula?*), "Tibet" (FBI).
" DAPHNOIDES Vill. Sapi River?, "Western Tibet" (FBI), Ladak (Hend.).
" FLABELLARIS Anderss.* Cultivated in Ladak (Brandis), Kangi (Meebold).
" PYCNOSTACHYA Anderss.* Cultivated in Ladak (Brandis).
" ANGUSTIFOLIA Willd. Cultivated at Khalotse (R.R.S.), Nubra and Shayuk (FBI).

† An undetermined species of *Allium*, close to *A. rubellum* Bieb., was collected at Suru.

SALIX DIVERGENS Anders.* Zanskar. (FBI).
" TETRASPERMA Roxb.* Dras Valley (Hend.).
" OXYCARPA Anderss.*† Kangi (Meebold).

JUGLANDACEAE

JUGLANS REGIA L. Cultivated in Indus Valley.

BETULACEAE

BETULA UTILIS D. Don. Not noticed beyond the Zoji Pass (R.R.S.), (Hend.).

ULMACEAE

ULMUS PARVIFOLIA Jacq. Saspola (R.R.S.), Nubra (FBI).

URTICACEAE

URTICA HYPERBOREA Jacq. Lachalung, Kargil?
" DIOICA L.* "Western Tibet" (FBI).
PILEA PEPLOIDES Hook. & Arn.* Zanskar (FBI).
PARIETARIA DEBILIS Forst.* "Western Tibet" (FBI).

MORACEAE

MORUS ALBA L. Cultivated in the Indus Valley.

SANTALACEAE

THESIUM HIMALENSE Royle.* Dras Valley (Hend., under *Th. multicaule* Ledeb.), East Kangi (Meebold), "Western Tibet" (FBI).

POLYGONACEAE

RUMEX ORIENTALIS Bernh. Nyemo. The fruit is almost free from tubercles and the plant may therefore be *R. aquaticus* L. The same thing, collected by Schlagintweit, is marked "*R. crispus* L. var."
RUMEX ACETOSA L.* Dras (Hend.).
OXYRIA DIGYNA (L.) Hill. Saspola, Baralacha.
RHEUM SPICIFORME Royle. Lachalung La.
" TIBETICUM Meissn. Gya.
" WEBBIANUM Royle.* Kangi (Meebold).
" EMODI Wall.* Kangi (Meebold).
POLYGONUM ISLANDICUM Hook. Gya.
" FILICAULE Wall.* Ladak (FBI).
" COGNATUM Meissn. Dras, Baralacha.
" PARONYCHIOIDES C. A. Mey. Kharbu, Leh?
" AVICULARE L. Fotu La.
" TUBULOSUM Boiss.* "Western Tibet" (FBI), Leh (Meebold).
" MOLLIAEFORME Boiss. Baralacha, very dwarf.
" VIVIPARUM L. Khardong La, Kharbu.
" SPHAEROSTACHYUM Meissn.* "Western Tibet" (FBI).
" AMPLEXICAULE D. Don. Suru.
" AFFINE D. Don. Sapi La, Baralacha.
" VACCINIIFOLIUM Wall.* Ladak (FBI).
" LAPATHIFOLIUM L. Khalotse to Yuru.

† An undetermined species of *Salix* was collected at Rusi La.

POLYGONUM TOMENTOSUM Schrank. Leh (R.R.S.); a specimen of this from Schlagintweit is mixed with *P. Persicaria*.

POLYGONUM PERSICARIA L.* "Western Tibet" (FBI).

" HYDROPIPER EGLANDULOSA Hook. f.* Ladak (FBI).

" POLYSTACHYUM Wall. Suru.

" TORTUOSUM D. Don.* Rupshu, Sapi La, Lachalung.

" SIBIRICUM Laxm. Gya, Himis, Lachalung; very dwarf.

" CONVOLVULUS L.* Nubra (FBI), Eastern Kangi (Meebold, as *P. nepalense* Meissn.).

POLYGONUM ALATUM Buch.-Ham. Timisgam.

FAGOPYRUM TATARICUM Gaertn. Leh, etc., cultivated.

" ESCULENTUM Moench.* Weed of cultivated grounds in Ladak (Hend.), Zanskar, etc. (FBI).

CHENOPODIACEAE

CHENOPODIUM ALBUM L. Lachalung, 16,000 ft. alt. A Himis specimen is only 2 in. tall. Ubiquitous.

CHENOPODIUM OPULIFOLIUM Schrad.* "Western Tibet" (FBI).

" HYBRIDUM L.* Ladak (FBI).

" GLAUCUM L.* Ladak (FBI).

" BOTRYS L. Common weed in Indus Valley; Ladak.

" BLITUM Hook. Matayan.

ATRIPLEX HORTENSIS L.* "Western Tibet" (FBI).

" CRASSIFOLIA C. A. Mey. Rachogpa, Fotu La, Kargil.

" ROSEA L. Leh (Hend.), Sassar and Haule (FBI), Rokshin (R.R.S.).

EUROTIA CERATOIDES C. A. Mey. Common, sometimes furnishing the only fuel at high altitudes.

AXYRIS AMARANTHOIDES L.* "Western Tibet" (FBI).

" AMARANTHOIDES HUMIFUSA? Rusi La.

CHENOLEA DIVARICATA Hook. Nyemo; a colonial annual, forming dense, hairy, pyramidal masses in the desert. This may be the *Echinopsilon mollis* of Henderson, which he noted in the Indus Valley.

KOCHIA PROSTRATA Schrad. Dras, Namika, Kargil.

" ODONTOPTERA Schrenk. Saspola, Himis.

CORISPERMUM HYSSOPIFOLIUM L.* "Western Tibet" (FBI).

SUAEDA CORNICULATA Bunge.* "Western Tibet," Parang Valley and Hanle plains (FBI).

SUAEDA MICROSPERMA Ledeb. Ladak, banks of the Indus, Pangong Lake, etc. (FBI); I have immature specimens from Spitug by the Indus that seem to be this.

SALSOLA KALI L. Khalotse to Leh.

" COLLINA Pall. Khalotse to Leh, Tsokar Lake.

HALOXYLON THOMSONI Bunge. Tralsi, Nyemo, Leh.

HALOCHARIS VIOLACEA Bunge. Saspola, Gya, Tralse, Leh?

HALOGETON GLOMERATUS C. A. Mey. Gya, Leh.

CARYOPHYLLACEAE

STELLARIA MEDIA (L.) Cyrill. Leh.

" TIBETICA Kurz.* Trantse Lundo (FBI).

" GRAMINEA L. Common.

" DECUMBENS Edgew. Baralacha.

STELLARIA GLAUCA With.* Indus Valley (FBI).
" SUBUMBELLATA Edgew.* Nubra (FBI).
" SEMIVESTITA Edgew.* Kangi (Meebold).
CERASTIUM TRIGYNUM Villars. Khardong.
" VULGATUM L. Zoji to Matayan.
" VULGATUM TIBETICA Edgew. & Hook. f.* Ladak.
" VULGATUM NEPALENSE Wall.* Kangi (Meebold).
SAGINA PROCUMBENS L.* "Western Tibet" (FBI).
ARENARIA GRIFFITHSII Boiss. Dras Kharbu, Sapi La, Rusi La.
" KASHMIRICA Edgew.* Kangi (Meebold), "Western Tibet" (FBI).
" MUSCIFORMIS Wall. Lachalung.
" FOLIOSA Royle. Sapi.
" SERPYLLIFOLIA L.* "Western Tibet" (FBI).
" STRACHEYI Edgew.* Ladak (FBI).
" HOLOSTEOIDES Edgew. Common in fields.
THYLACOSPERMUM RUPIFRAGUM Schrenk.* "Alpine Western Tibet" (FBI).
SILENE VULGARIS (Moench.) Garcke (*S. inflata* Smith). Common in fields.
" CONOIDEA L.* Moolbeck (Hend.), Leh (Meebold), Ladak (FBI).
" MOORCROFTIANA Wall. Namika La, Kharbu, Baralacha.
" TENUIS Willd. Common.
LYCHNIS APETALA L. Yarungshan, Khardong, Lachalung.
" HIMALAYENSIS Edgew. Leh, Suru; more than minutely pubescent.
" NUTANS Benth. Suru.
" MACRORHIZA Royle. Lachalung.
GYPSOPHILA SEDIFOLIA Kurz. Zanskar and Dras (FBI); mine is *sine loco*.
DIANTHUS ANATOLICUS Boiss. Zoji to Matayan, Sapi, Baralacha.
" DELTOIDES L.* "Western Tibet" (FBI).
" SEGUIERI Vill. Ladak (FBI).
" ANGULATUS Royle.* Zanskar (FBI).
" CRINITUS Sm.* Moolbeck (Hend.), Western Tibet (FBI).
SAPONARIA VACCARIA L. A common weed in fields.

RANUNCULACEAE

ISOPYRUM GRANDIFLORUM Fisch. Lachalung.
AQUILEGIA VULGARIS VISCOSA Hook. f. & Thoms. Kargil, Lachalung.
" VULGARIS PYRENAICA (DC.) Hook. f. & Thoms. Moolbeck, Sapi La.
DELPHINIUM BRUNONIANUM Royle. Khardong, Takilung La, Yarungshan, etc.
" CASHMIRIANUM Royle. Sapi La.
ACONITUM HETEROPHYLLUM Wall. Suru to Sirimarg, Yarungshan.
" NAPELLUS MULTIFIDUM (Royle) Hook. f. & Thoms. Suru, Sapi La.
ANEMONE RUPICOLA Cambess. Rusi La, Zoji to Matayan.
" RIVULARIS Buch.-Ham. Timisgam.
" ALBANA Stev.* "Western Tibet" (FBI).
CLEMATIS ORIENTALIS ACUTIFOLIA Hook. f. & Thoms. Common in the Indus Valley; one collection near Saspola Drokpo had almost black flowers.
OXYGRAPHIS POLYPETALA Hook. f. & Thoms.* Kangi La (Meebold), Dras (Duthie, etc.).
RANUNCULUS CYMBALARIA Pursh. Common; the leaves are smaller and less lobed than American specimens.

RANUNCULUS HYPERBOREUS NATANS Regel. Khardong.
" HYPERBOREUS MULTIFIDUS Hook. f. & Thoms.* Ladak (FBI).
" PULCHELLUS C. A. Mey. Common at high levels.
" LAETUS Wall.* Near Zoji (Hend.), "Western Tibet" (FBI).
" AFFINIS R. Br. Kharbu.
" HIRTELLUS Royle. Common, especially along the great range of the Himalaya.
RANUNCULUS LOBATUS Jacquem.* Ladak (Hend.), Zanskar (FBI).
" AQUATILIS TRICHOPHYLLUS Gray. Matayan.
THALICTRUM MINUS L. To Matayan.
" MINUS FOETIDUM (L.) Hook. f. & Thoms. Common in villages.
" ALPINUM L.* "Western Tibet" (FBI).
" PLATYCARPUM Hook. f. & Thoms.* Nubra (FBI).
" RUTAEFOLIUM Hook. f. & Thoms.* "Western Tibet" (FBI).
ADONIS CHRYSOCANTHUS Hook. f. & Thoms. Matayan.

BERBERIDACEAE

PODOPHYLLUM EMODI Wall. Suru.
BERBERIS VULGARIS L. Near Kargil (Hend.), "Western Tibet" (FBI).
" ULICINA Hook. f. & Thoms.* Nubra (FBI).

PAPAVERACEAE

HYPECOUM LEPTOCARPUM Hook. f. & Thoms. Lachalung La.
MECONOPSIS ACULEATA Royle. Baralacha Pass and along "great range."
PAPAVER NUDICAULE L. Khardong La.
CORYDALIS TIBETICA Hook. f. & Thoms. Back of Leh.
" MOORCROFTIANA Wall.* Guge (FBI).
" GORTSCHAKOVII Schrenk. Yarungshan.
" STRICTA Steph. Lachalung.
" FLABELLATA Edgew. Numika La, Kargil to Moolbeck.
" ADIANTIFOLIA Hook. f. & Thoms.* Zanskar (FBI).
" CRASSIFOLIA Royle. Rachogpa? (R.R.S.), Dras (Duthie).
" MEIFOLIA Wall. Baralacha Pass.

CRUCIFERAE

LEPIDIUM LATIFOLIUM L. Namika La, Saspola, Spituk, etc.; Thellung notes several varieties of this in Ladak.
LEPIDIUM CAPITATUM Hook. f. & Thoms. Lachalung La.
" APETALUM Willd. A species close to the above, Gya, "Western Tibet" (FBI, under *L. ruderale* L.).
DILOPHIA SALSA Thoms.* "Western Tibet" (FBI).
THLASPI ARVENSE L. Sapi La, Kharbu, Nyemo, Shergol.
" ALPESTRE L. Matayan, Spituk.
COCHLEARIA SCAPIFLORA Hook. f. & Thoms.* Masimik La (Hend.).
SISYMBRIUM MOLLISSIMUM C. A. Mey. Leh.
" HUMILE C. A. Mey.* (*Braya humilis* Robinson). Chang La (Hend.), Kangi (Meebold), "Western Tibet" (FBI).
SISYMBRIUM MINUTIFLORUM Hook. f. & Thoms.* Zanskar (FBI).
" SOPHIA L.* Leh, Nyemo.
" COLUMNAE Jacquem. Namika La, Gya.
" THALIANUM (L.) J. Gay.

TAUSCHERIA LASIOCARPA DC.* "Western Tibet" (FBI).

BRASSICA NAPUS L. Sometimes very dwarf; Spituk, Khalotse to Yuru. It is probable that other species of *Brassica* occur, such as *B. nigra* (L.) Koch and *B. juncea* (L.) Coss.

CRAMBE CORDIFOLIA Stev.* "Western Tibet" (FBI).

BARBAREA VULGARIS R. Br.* Dras (Hend.), "Western Tibet" (FBI).

CARDAMINE MACROPHYLLA LOBATA Hook. f. & Thoms.* "Western Tibet" (FBI).

CAPSELLA ELLIPTICA C. A. Mey.* Leh (Meebold), "Western Tibet" (FBI).

" THOMSONI Hook. f.* Ladak, Nubra (FBI).

DRABA GLACIALIS Adams. Rusi La.

" ALPINA L. Yarungshan, Sapi?

" INCANA L.* "Western Tibet" (FBI).

" LASIOPHYLLA Royle. Baralacha Pass.

" FLADNIZENSIS Wulf.* Leh, Kangi (Meebold), "Western Tibet" (FBI).

" FLADNIZENSIS HOMOTRICHA (Ledeb.) Hook. f. & Thoms. Nubra (FBI).

" TIBETICA THOMSONI Hook. f. & Thoms.† Zanskar (FBI).

ARABIS TIBETICA Hook. f. & Thoms. Lachalung.

" GLANDULOSA Kar. & Kir.* Near Ladak (FBI).

" GLABRA (L) Bernh.* Leh (Meebold).

" ALPINA L. Zoji La (Hend.).

ERYSIMUM ODORATUM Ehrh. Zoji to Matayan.

" HIERACIFOLIUM L.* Dras Valley (Hend., under *E. strictum* Gaertn.).

CHEIRANTHUS HIMALAYENSIS Cambess.* Kangi La (Meebold), "Western Tibet" (FBI).

CHEIRANTHUS STEWARTII T. Anders.* Near Ladak (FBI).

" ALBIFLORUS T. Anders.* Zanskar (FBI).

ALYSSUM CANESCENS DC. Tsokar Lake.

BRAYA ALPINA Sternb. & Hoppe. Rokshin.

" UNIFLORA Hook. f. & Thoms.* Nubra (FBI).

" TIBETICA Hook. f. & Thoms.* "Western Tibet" (FBI).

" ROSEA Bunge.* "Western Tibet" (FBI), Leh (Meebold).

ATELANTHERA PERPUSILLA Hook. f. & Thoms.* Zanskar (FBI).

MALCOLMIA AFRICANA R. Br.* Ladak (J.L.S.), "Western Tibet" (FBI).

EUCLIDIUM SYRIACUM R. Br.* East Kangi (Meebold).

MATTHIOLA ODORATISSIMA R. Br. Near Leh, to Kargil.

CHORISPORA SABULOSA Cambess. Suru, Zoji to Matayan.

CHRISTOLEA CRASSIFOLIA Cambess. Common on high dry passes such as the Fotu, Namika and Lachalung.

PARRYA EXSCAPA C. A. Mey.* "Western Tibet" (FBI).

" MACROCARPA R. Br.* Alpine region of Western Tibet (FBI).

" LANUGINOSA Hook. f. & Thoms.* Gugi (FBI); probably not Ladak.

CONRINGIA PLANISILIQUA Fisch. & Mey. Saspola.

CAPPARIDACEAE

CAPPARIS SPINOSA L. Khalotse.

† An undetermined species of *Draba*, close to *D. incana* but with the fruit not hairy, was collected at Rokshin and Yarungshan; a second undetermined species, probably undescribed, was likewise found at Yarungshan.

CRASSULACEAE

SEDUM RHODIOLA DC. Dras, Suru, Rusi La, Baralacha.
" TILLAEOIDES Duthie? Khardong.
" QUADRIFIDUM Pall.* Leh oasis (Meebold).
" ASIATICUM Spreng. Suru, Sirimarg.
" EWERSII Ledeb. Sapi La, Suru to Sirimarg, Khalotse to Yuru.
" TIBETICUM STRACHEYI Hook. f. & Thoms. Common at high altitudes; Rupshu, Suru and Ladak.
SEMPERVIVUM ACUMINATUM Jacquem. Common.

SAXIFRAGACEAE

SAXIFRAGA SIBIRICA L. Fotu La, Baralache Matayan.
" CERNUA L. Yarungshan.
" HIRCULUS L. "Western Tibet" (FBI), the typical form and varieties.
" HIRCULUS INDICA C. B. Clarke. Rokshin, Rusi La, Yarungshan, Khardong.
SAXIFRAGA JACQUEMONTIANA Decne. Yarungshan.
" RAMULOSA Wall.* Kangi (Meebold).
" FLAGELLARIS Willd. Khardong La, Rusi La, Yarungshan.
" FLAGELLARIS MUCRONULATA (Royle) C. B. Clarke. Zoji to Matayan, Moolbeck.
SAXIFRAGA OPPOSITIFOLIA L.* "Western Tibet" (FBI).
" STRACHEYI Hook. f. & Thoms. Sapi La.
PARNASSIA OVATA Ledeb. Kharbu, Gya.
" PALUSTRIS L.* "Western Tibet" (FBI); probably from Skardo.
RIBES ORIENTALE Desf. Dras, Dras to Kharbu, Barso Valley.
" GROSSULARIA L.*

ROSACEAE

COTONEASTER VULGARIS Lindl.* "Western Tibet" (FBI).
" NUMMULARIA Fisch. & Mey. Near Kargil.
" ACUMINATA Lindl. Eastern Kangi (Meebold).
PYRUS MALUS L. Cultivated in Ladak.
" COMMUNIS L. "Western Tibet" (FBI); rare in Ladak, if present at all.
RUBUS SAXATILIS L.* Dras (FBI).
POTENTILLA SIBBALDI Hall. f.(*Sibbaldia procumbens* L.). Suru to Sirimarg.
" TETRANDRA Hook. f. Lachalung, back of Leh.
" FRUTICOSA L. Ladak, Baralacha; not the typical American *P. fruticosa*.
POTENTILLA FRUTICOSA OCHREATA (Lindl.) Lehm. Rachogpa.
" FRUTICOSA INGLISII (Royle) Hook. f. Yarungshan Pass.
" FRUTICOSA PUMILA Hook. f. Ladak (place lost), Kangi (Meebold).
" SALESOVII Steph.* Ladak (J.L.S.), Eastern Kangi (Meebold), "Western Tibet" (FBI).
POTENTILLA AMBIGUA Cambess. Zingzingbar, Rupshu.
" ANSERINA L. Leh, Timisgam, Fotu La.
" BIFURCA L. Common.
" MULTIFIDA L. Common; the typical form and varieties.
" SERICEA L. Common.
" CURVISETA Hook. f.* Kangi (Meebold).

POTENTILLA ARGYOPHYLLA Wall. Matayan, Baralacha?

" ARGYROPHYLLA LEUCOCHROA (Lindl.) Hook. f. Baralacha, Khardong.

" ATROSANGUINEA Lodd. Zoji.

" GELIDA C. A. Mey.* "Western Tibet" (FBI).

" NIVEA L. "Western Tibet" (FBI).

CHAMAERHODOS SABULOSA Bunge.* "Western Tibet" (FBI).

ROSA EGLANTERIA L. Zoji to Matayan, Kharbu, Himis Shukpa; some of the flowers are double.

ROSA WEBBIANA Wall. Common; large and very handsome, often covering arid hillsides with pink.

PRUNUS ARMENIACA L. The chief fruit tree in Ladak up to 11,000 ft. alt.

" TOMENTOSA Thunb. Saspola.

" PERSICA (L.) Stokes.* Ladak (Vigne, J.L.S.).

LEGUMINOSEAE

SOPHORA MOORCROFTIANA Benth.* Ladak (FBI).

" ALOPECUROIDES L.* "Western Tibet" (FBI).

THERMOPSIS INFLATA Cambess. Rusi La.

TRIGONELLA EMODI Benth. Himis Shupko.

" CORNICULATA L.* Dras (Hend.), Ladak (FBI).

TRIFOLIUM PRATENSE L.*

MEDICAGO FALCATA L. Common in villages.

" SATIVA L. Cultivated.

" LUPULINA L. Matayan, Leh, Gya.

MELILOTUS OFFICINALIS (L.) Lam. Common in villages.

" ALBA Desr.* Saspola? (R.R.S.), Nubra, Ladak (FBI).

COLUTEA ARBORESCENS NEPALENSIS (Sims) Baker.* Ladak (Brandis).

CARAGANA PYGMEA DC. Common from 12,000 to nearly 17,000 ft. alt. Its thick woody roots and thorny stems furnish the only fuel for travellers in many places. Especially common in Rupshu.

CARAGANA CUNEATA Baker.* Ladak (FBI), Leh (Meebold).

ASTRAGALUS HEYDEI Baker.* Tsokar Lake (FBI).

" TRIBULIFOLIUS Benth.* Hanle and Rupshu (FBI).

" FALCONERI Bunge.* Kangi (Meebold), "Western Tibet" (FBI).

" ADESMIAEFOLIUS Benth. Kargil.

" OPHIOCARPUS Benth.* Ladak (FBI).

" GRACILIPES Benth.* Zanskar and Indus Valley (FBI).

" CONFERTUS Benth.* Ladak (Hend., FBI).

" TIBETANUS Benth. Sapi La, Gya.

" STRICTUS R. Grah. Leh, Himis.

" OXYODON Baker.* Khardong (Meebold).

" DENSIFLORUS Kar. & Kir.* Leh (Meebold), Ladak (FBI).

" MELANOSTACHYS Benth. Suru to Sirimarg.

" HIMALAYANUS Klotzsch. Suru, Matayan to Dras.

" MUNROI Benth. Moolbeck, Himis Shupko, Khalotse, Namika La. A remarkable, densely hairy species with large inflated pods and yellow flowers, growing in the open desert.

ASTRAGALUS MACROPTERUS DC. Kharbu, Namika La.

" CILIOLATUS Benth.* Dras (Hend.), Ladak (FBI).

ASTRAGALUS COLUTEOCARPUS Boiss. Dras, Barso Valley.
" FRIGIDUS (L.) Bunge. Zoji, Suru Sirimarg?
" RHIZANTHUS Royle.† Matayan, Dras, Khardong, Suru to Sirimarg.
" WEBBIANUS R. Grah.* "Western Tibet" (FBI).
" ROYLEANUS Bunge. *A. Candolleanus* Royle,* not Boiss., "Western Tibet" (FBI); I found this species at Amarnath just over the Great Range on the Kashmir side.
ASTRAGALUS CICERIFOLIUS Royle. Leh.
" MULTICEPS Wall.* Ladak (FBI).
" PEDUNCULARIS Royle.* Dras, Zanskar (FBI).
" SUBULATUS Pall. Kharbu, Matayan, Gya, Sapi La.
" NIVALIS Kar. & Kir. Fotu La.
" HYPOGLOTTOIDES Baker.* "Tibetan Himalayas" (FBI).
" ZANSKARENSIS Benth.* Zanskar (FBI).
LOTUS CORNICULATUS L. Suru.
OXYTROPIS LAPPONICA Gaud. Nyemo, Leh, Spitug, Khardong, Lachalung.
" MOLLIS Royle. To Matayan.
" DENSA Benth. Lachalung.
" TATARICA Cambess. Dras, Kharku Moolbeck, Lachalung, etc.
" CACHEMIRICA Cambess. Namika La.
" MICROPHYLLA DC. Gya, Tsokar, Lachalung.
" THOMSONI Benth.*‡ Ladak (FBI).
STRACHEYA TIBETICA Benth.* Pangong Lake (FBI).
HEDYSARUM MICROCALYX Baker. Suru.
CICER SONGARICUM Steph. Commonly cultivated.
VICIA FABA L. Cultivated.
" TENUIFOLIA Roth. Kharbu.
ERVUM LENS L. Cultivated in Ladak.
LATHYRUS SATIVUS L.* In fields (J.L.S., Hend.).
" ALTAICUS Ledeb. To Matayan, Suru to Wardwan.
PISUM SATIVUM L. Cultivated in Ladak.

GERANIACEAE

GERANIUM COLLINUM Steph. Khardong, Sapi?
" GRANDIFLORUM Edgew.* Kangi (Meebold).
" PRATENSE L. Kharbu, Himis.
" SIBIRICUM L.* Ladak (FBI).
" POLYANTHES Edgew. & Hook. f.* Dras (Duthie).
ERODIUM STEPHANIANUM Willd.* Ladak (FBI).
" TIBETANUM Edgew. Gya.
" CICUTARIUM (L.) L'Her. "Little Tibet" (FBI).
BIEBERSTEINIA EMODII Jaub. & Spach. (*B. odora* Royle.) Lachalung, Khardong (given by Dr. Schmidt).

LINACEAE

LINUM PERENNE L. Dras.

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† Another species of *Astragalus*, close to *A. rhizanthus* but not matched at Kew, was found at Namika La.

‡ A species of *Oxytropis*, not matched at Kew, was found between Suru and Sirimarg.

ZYGOPHYLLACEAE

PEGANUM HARMALA L. Himis, Leh, Saspola.
TRIBULUS TERRESTRIS L. Leh.

EUPHORBIACEAE

EUPHORBIA TIBETICA Boiss. Kharbu, Himis.
" THOMSONIANA Boiss. Matayan.
" MADDENII Boiss.* Ladak (Hend.).

BALSAMINACEAE

IMPATIENS BRACHYCENTRA Kar. & Kir. Suru to Sirimarg.
" THOMSONI Hook. f. Suru.

MALVACEAE

LAVATERA KASHMIRIANA Cambess. Suru.
MALVA VERTICILLATA L. Leh.

HYPERICACEAE

HYPERICUM PERFORATUM L. Suru.

TAMARICACEAE

TAMARIX GALLICA PALLASII (Desv.) Thist.-Dyer.* Ladak (Hend.), "Western Tibet" (FBI).
MYRICARIA ELEGANS Royel. Common in the thickets along the Indus and tributaries.
" GERMANICA Desv. In similar situations as the above.
" GERMANICA PROSTRATA Hook f. & Thoms. Ladak, 16,000 ft. alt. (Hend.)'

VIOLACEAE

VIOLA KUNAWARENSIS Royle. Near Leh (specimen given by Dr. Schmidt).
" CINEREA Boiss.* Ladak (Hend.); probably the above.

ELAEAGNACEAE

HIPPOPHAË RHAMNOIDES L. Common; its spinous branches are much used for hedges.
HIPPOPHAË SALICIFOLIA D. Don.* Dras (Duthie, 17).
ELAEAGNUS HORTENSIS Bieb. Leh (specimens given by Dr. Schmidt).

ONAGRACEAE

EPILOBIUM ROYLEANUM Haussk. Common and very variable.
" ROSEUM ANAGALLIDIFOLIUM (Lam.) C. B. Clarke.* "Western Tibet" (FBI).
EPILOBIUM LATIFOLIUM L. Suru-Sirimarg, Rusi La.
" ANGUSTIFOLIUM L. In the shade of willows; Kharbu, Dras, Sapi River, etc.
EPILOBIUM MINUTIFLORUM Haussk.* (*E. palustre minimum* C. B. Clarke of FBI). Leh, Nubra (Haussknecht).

HALORAGIDACEAE

HIPPURIS VULGARIS L. Leh.

UMBELLIFERAE

ERYNGIUM BILLARDIERI Delar.* Ladak (FBI).

CHAEROPHYLLUM VILLOSUM Wall. Without definite locality (R.R.S.), Dras and Lamayuru (Hend.).

CHAEROPHYLLUM ACUMINATUM Lindl. Suru.

TRACHYDIUM ROYLEI Lindl. Rusi La.

PLEUROSPERMUM HOOKERI THOMSONI C. B. Clarke.* "Western Tibet" (FBI).

" CANDOLLII Benth.? Yarungshan, Suru-Sirimarg (not mature).

" STELLATUM LINDLEYANUM (Klotzsch) C. B. Clarke. Lachalung.

PRANGOS PABULARIA Lindl. Matayan.

BUPLEURUM FALCATUM L. Zoji to Matayan, Suru.

" FALCATUM NIGROCARPA (Jacquem.) C. B. Clarke. Fotu La.

" TENUE Buch.-Ham.* Lamayuru (Hend.).

PITURANTHOS THOMSONI C. B. Clarke.* "Western Tibet" (FBI).

CARUM CARVI L. Leh, in the village.

PIMPINELLA SAXIFRAGA DISSECTIFOLIA C. B. Clarke. "Western Tibet" (FBI), Gya? (R.R.S.).

LIGUSTICUM THOMSONI C. B. Clarke. Common.

FERULA JAESCHKEANA Vatke. Matayan.

HERACLEUM THOMSONI C. B. Clarke.* Ladak (FBI).

" THOMSONI GLABRIOR C. B. Clarke.* Dras (Hend.).

" PINNATUM C. B. Clarke. Moolbeck, Himis?

" CANDICANS Wall. Zoji to Matayan, Dras?

PRIMULACEAE

PRIMULA DENTICULATA CAPITATA (Hook.).* Zoji La (Hend.).

" FARINOSA L.* "Western Tibet" (FBI).

" HEYDEI Watt.* "Western Tibet" (FBI).

" SIBIRICA Jacq. Fotu La, Lachalung, Chamba Kharbu.

" BREVICALYX DC. Kangi (Meebold).

" INVOLUCRATA Wall.* "Western Tibet" (FBI).

" ELLIPTICA Royle. Rupshu to Lahoul (R.R.S.), Ladak (FBI).

" MEEBOLDII Pax.* Kangi (Meebold).

" PURPUREA Royle (included under *P. Stuartii* in FBI). Leh (specimens given by Dr. Schmidt), Yarungshan.

PRIMULA STUARTII Wall.* "Western Tibet" (FBI).

ANDROSACE ROTUNDIFOLIA GLANDULOSA Hook. f.* "Western Tibet" (FBI).

" ROTUNDIFOLIA THOMSONI Hook. f.* "Western Tibet" (FBI).

" SEPTENTRIONALIS L. Spituk.

" AIZOON Duby.* Dras (Hend.), "Western Tibet" (FBI).

" SEMPERVIVOIDES Jacquem.* "Western Tibet" (FBI).

" MICROPHYLLA Hook. f.* "Western Tibet" (FBI).

" SARMENTOSA Wall.* Ladak (Hend.).

" SARMENTOSA PRIMULOIDES (Duby) Hook. f. Matayan.

" CHAMAEJASME Wulf.* Ladak (Hend.).

" CHAMAEJASME CORONATA Hook. f.* "Western Tibet" (FBI).

" VILLOSA L. Fotu La, Sapi.

GLAUX MARITIMA L.* Ladak (Hend.), "Western Tibet" (FBI).

PLUMBAGINACEAE

ACANTHOLIMON LYCOPODIOIDES Boiss. A remarkable sharp-leaved, tufted plant; common on the passes in Ladak.

STATICE MACRORRHABDOS Boiss.* Ladak (FBI).

OLEACEAE

FRAXINUS EXCELSIOR L.* Ladak (FBI).

GENTIANACEAE

JAESCHKEA LATISEPALA C. B. Clarke.* "Western Tibet" (FBI).

GENTIANA MOORCROFTIANA Griseb. Kharbu, Sapi La, Suru to Sirimarg.

" AUREA L. Kharbu, Sapi La, Moolbeck?

" THOMSONI C. B. Clarke.* Karakorum, Nubra (FBI).

" BOREALIS Bunge.* "Western Tibet" (FBI).

" TENELLA Rottb. Yarungshan, Himis Shupko.

" AQUATICA L. Leh, Himis Shupka, Himis Lachalung La.

" HUMILIS Stev. Fotu La.

" PSEUDO-HUMILIS Burk.* Leh, Himis, Kargil, Rupshu, etc. (7)

" PYGMAEA C. B. Clarke.* Karakorum, Nubra (FBI).

" SQUARROSA Ledeb.* "Western Tibet" (FBI).

" CARINATA Griseb. Yarungshan.

" HUGELII Griseb.* Zanskar (FBI).

" DECUMBENS L. Sapi La.

" SERRATA Gunner. Kharby, Gya, Fotu La.

" SERRATA **Stracheyi** (C. B. Clarke) comb. nov. (*G. detonsa Stracheyi* C. B. Clarke). Himis Shupka.

GENTIANA LEUCOMELAENA Maxim.* Kangi (Meebold).

PLEUROGYNE CARINTHIACA G. Don. Rusi La, Sapi La.

" THOMSONI C. B. Clarke. Fotu La.

" BRACHYANTHERA C. B. Clarke.* Karakorum (FBI).

SWERTIA CORDATA Wall. "Western Tibet" (FBI).

" PETIOLATA Royle. Rusi La, Sapi La?

HALENIA ELLIPTICA D. Don. Himis Shupka.

APOCYNACEAE

APOCYNUM VENETUM L. Khalotse.

ASCLEPIADACEAE

CYNANCHUM GLAUCUM Wall. Kargil, Saspola.

" ACUTUM L. Namika La.

" HEYDEI Hook. f. Between Saspola and Khalotse. My specimens are from the type locality, and it seems that this may be only a form of *C. acutum* with overlapping basal lobes to the leaves.

CONVOLVULACEAE

CUSCUTA CAPITATA Roxb. Barso Valley, on Galium.

" EUROPAEA L. Indus Valley, up to 11,000 ft. alt. The species which J. L. Stewart reported as common under the name *C. planiflora* Tenore is probably this.

CONVOLVULUS ARVENSIS L. A weed of cultivated land in Ladak.

BORAGINACEAE†

ACTINOCARYA TIBETICA Benth. Nubra, near Karsar Village (FBI).
OMPHALODES THOMSONI C. B. Clarke.* Nubra (FBI).
CYNOGLOSSUM PETIOLATUM A. DC.* Zanskar (FBI).
" WALLICHII G. Don. Dras, Kharbu? I am following Collett (13) in including *C. denticulatum* G. Don here.
LINDELOFIA BENTHAMI Hook. f. Leh, Namika La.
SOLENANTHUS CIRCINATUS Ledeb. Zanskar (FBI).
PARACARYUM HELIOCARPUM Kern. Matayan to Dras.
" THOMSONI C. B. Clarke.* Nubra (FBI).
" HIMALAYENSE C. B. Clarke. Nubra (FBI), without definite locality (R.R.S.).
PARACARYUM TIBETICUM C. B. Clarke. Himis Shupka, Khalotse to Yuru.
ECHINOSPERMUM BARBATUM Lehm.* Ladak (Hend.).
" REDOWSKII Lehm.* Leh (FBI).
" SEMIGLABRUM Ledeb.* "Western Tibet" (FBI).
ERITRICHIUM STRICTUM Decne. Fotu La? Khardong? (R.R.S.), "Western Tibet" (FBI).
ERITRICHIUM SPATHULATUM C. B. Clarke.* "Western Tibet" (FBI).
" TIBETICUM C. B. Clarke.* Ladak (FBI).
ASPERUGO PROCUMBENS L.* "Western Tibet" and the Karakorums (FBI).
MICROULA BENTHAMI C. B. Clarke.* "Western Tibet" (FBI).
LYCOPSIS ARVENSIS L. Kharbu.
MYOSOTIS SYLVATICA Hoffm. Yarungshan, Spituk? very near *M. alpestris* F. W. Schmidt.
MERTENSIA ECHIOIDES Benth.* "Western Tibet" (FBI).
" TIBETICA C. B. Clarke.* Karakorum (FBI).
LITHOSPERMUM ARVENSE L.* "Western Tibet" (FBI).
MACROTOMIA BENTHAMI DC.* Kangi (Meebold).
" PERENNIS Boiss. Dras.
ARNEBIA TIBETANA Kurz. Saspola, Nyemo.
" THOMSONI C. B. Clarke. Ladak.
ONOSMA ECHIOIDES L. Matayan.
ROCHELIA STELLULATA Reichb.* Nubra (FBI).
" RECTIPES Stocks.* Zanskar (FBI).
" CARDIOSEPALA Bunge.* Nubra (FBI).

LABIATAE

SCUTELLARIA PROSTRATA Jacquem. Zoji to Matayan, Suru to Wardwan.
" HEYDEI Hook. f.* Zanskar (FBI), Kangi (Meebold).
MARRUBIUM LANATUM Benth. Tsokar Lake.
NEPETA BOTRYOIDES Ait. Rupshu (FBI).
" LINEARIS Royle. Matayan.
" THOMSONI Benth.* Hanle (FBI).
" DISCOLOR Royle. Zoji to Matayan, Khardong La, Rusi La, Nyemo, etc., Suru to Sirimarg; the specimens are rather large and may be near *N. spicata* Benth.

† Failure to get specimens in fruit made determinations of some of the Boraginaceae impossible.

NEPETA LONGIBRACTEATA Benth. Lachalung.
" GLUTINOSA Benth. Baralacha.
" FLOCCOSA Benth. Common in the Indus Valley.
" LEUCOLAENA Benth. Dras, Suru, Kharbu.
" SALVIAEFOLIA Royle. Near Kargil. The relationship of the last two should be studied in the field. The dry specimens seem to intergrade.
NEPETA NIVALIS Benth. Lachalung La.
" TIBETICA Benth. Lachalung La.
" ERIOSTACHYA Benth.* Khardong (Meebold).
CALAMINTHA UMBROSA Fisch. & Mey. Zoji to Matayan.
DRACOCEPHALUM HETEROPHYLLUM Benth. Gya, Khardong La, Lachalung.
" STAMINEUM Kar. & Kir.* Ladak (Hend.), "Western Tibet" (FBI).
" NUTANS L. Suru.
PHLOMIS BRACTEOSA Royle. Yarungshan La.
LAMIUM RHOMBOIDEUM Benth.* "Western Tibet" (FBI).
" AMPLEXICAULE L. A weed in cultivated ground.
" ALBUM L. Suru.
STACHYS TIBETICA Vatke. Common in Indus Valley.
PEROWSKIA ABROTANOIDES Kiril. Common in Ladak.
ORIGANUM VULGARE L. Suru.
THYMUS SERPYLLUM L. Dras, Lachalung.
MENTHA SYLVESTRIS L. Common.
" ARVENSIS L.* Ladak, Indus Valley (Hend.).
ELSHOLTZIA DENSA Benth. Suru.
" PUSILLA Benth. Lachalung (FBI, as a variety of *E. eriostachya* Benth.).
" CRISTATA Willd.* "Western Tibet" (FBI).

SOLANACEAE

LYCIUM RUTHENICUM Murr. Nyemo, Tralse.
PHYSOCHLAINA PRAEALTA Miers. A common weed.
HYOSCYAMUS PUSILLUS L. Kharbu, Khalotse Himis; a remarkable range, from Egypt to Persia and the Altai.
PHYSALIS ALKEKENGI L.* Burgo (Hend.), probably cultivated.
SOLANUM NIGRUM L. Kargil.
" TUBEROSUM L. Introduced by the missionaries. About the finest tops I have ever seen were in Dr. Schmidt's garden in Leh, 11,500 ft. alt.
NICOTIANA RUSTICA L.* Ladak (J.L.S.).
" TABACUM L.* Dras (Hend.)

SCROPHULARIACEAE

VERBASCUM THAPSUS L. Dras to Kharbu, Barso Valley.
SCROPHULARIA LUCIDA L. Zoji, Matayan.
" VARIEGATA Bieb.* Moolbeck (Hend.).
" DENTATA Royle. Kharbu? (R.R.S.), Ladak (FBI).
" SCABIOSAEFOLIA Benth. Sapi La.
MIMULUS STRICTUS Benth.* Indus Valley, Ladak (Hend.).
LANCEA TIBETICA Hook. f. & Thoms. Fotu La, Leh.
LIMOSELLA AQUATICA L.* "Western Tibet" (FBI).
VERONICA DELTIGERA Wall. Matayan to Dras, Suru to Sirimarg.
" CILIATA Fisch.? Rokshin, Nyemo.

VERONICA MACROSTEMON Bunge.* Zanskar (FBI).
" ANAGALLIS-AQUATICA L. Leh.
" BECCABUNGA L.* Ladak (Hend.).
" BILOBA L.* "Western Tibet" (FBI), Eastern Kangi (Meebold).
" LAXA Benth. Zoji to Matayan.
" AGRESTIS L.† "Western Tibet" (FBI).
LAGOTIS GLAUCA J. Gaertn. Rusi La.
" GLOBOSA Hook. f.* "Western Tibet," Therichan Pass (FBI), Kangi La (Meebold).
LEPTORHABDOS BENTHAMIANA Walp.* Dras (FBI).
EUPHRASIA OFFICINALIS L. Himis, Kharbu, Shergol.
PEDICULARIS TENUIROSTRIS Benth. Suru.
" CHEILANTHIFOLIA Schrenk. Himis, Kharbu, Khalotse to Leh.
" MOLLIS Wall.* Nubra (FBI).
" PYCNANTHA Boiss.* Kangi (Meebold).
" BICORNUTA Klotzsch. Suru-Sirimarg.
" SIPHONANTHA D. Don. Kharbu.
" RHINANTHOIDES Schrenk. Dras. It is difficult to separate this species, from the preceding at least when working with dry material.
PEDICULARIS LONGIFLORA Rudolph (*P. tubiflora* Fisch.). This is an unusually interesting species, with yellow flowers and a very long corolla tube. It is abundant in wet places.
PEDICULARIS DOLICHORRHIZA Schrenk (*P. fissa* Hook. f.). Zoji to Matayan.
" OEDERI Vahl. *P. versicolor* Wahlenb. Lanak La (FBI), Zoji (Hend.). Like dozens of other plants this is found chiefly on the Indian side of the backbone of the Himalayas and has only scattered stations on the Tibetan side.

OROBANCHACEAE

OROBANCHE CERNUA Loefl.* "Western Tibet" (FBI).
" HANSII Kern. Shergol.

LENTIBULARIACEAE

UTRICULARIA MINOR L.* Nubra (FBI).

PLANTAGINACEAE

PLANTAGO MAJOR L. Shergol.
" TIBETICA Hook. f. & Thoms. Saspola, Gya, Tralse.
" BRACHYPHYLLA Edgew.* "Western Tibet" (FBI), Kangi (Meebold).

RUBIACEAE

GALIUM APARINE L. Leh.
" VERUM L. Zoji to Matayan, Dras, Barso Valley.
" BOREALE L. Zoji, Zoji to Matayan, Sapi La, Barso Valley, Spituk.
" TRICORNE Stokes.* Leh (Hend.), "Western Tibet" (FBI).
" PAUCIFLORUM Bunge. Rachogpa.
RUBIA TIBETICA Hook. Fotu La, Rachogpa.

† An undetermined species of *Veronica* with glandular hairs and very small flowers was collected at Dras.

CAPRIFOLIACEAE

LONICERA GLAUCA Hook. f. & Thoms. Leh, Sapi La, Lachalung.
" ASPERIFOLIA Hook. f. & Thoms. Zoji to Matayan, Sapi La.
" RUPICOLA Hook. f. & Thoms.* "Western Tibet" (FBI).
" SPINOSA Jacq. Lachalung, Fotu La, Chamba Kharbu.
" MICROPHYLLA Willd. Sapi La.
" HETEROPHYLLA Decne. To Matayan.
" MYRTILLUS Hook. f. & Thoms.* Ladak (Hend.), Kangi (Meebold).
" CAERULEA L. Zoji La; not the typical form.

VALERIANACEAE

VALERIANA DIOICA L. Ladak, probably correct but not in fruit; Kashmir to the Karakorum (FBI).
VALERIANA STRACHEYI C. B. Clarke. Kargil.
" WALLICHII DC.* Kangi (Meebold).

CAMPANULACEAE

CAMPANULA LATIFOLIA L. Suru.
" COLORATA TIBETICA Hook. f. & Thoms. Sapi La, Kharbu, Saspola, Khalotse to Yuru.
CAMPANULA ARGYROTRICHA Wall.* Eastern Kangi (Meebold).
" CASHMIRIANA Royle. Leh, Sapi La, Chamba Kharbu.
" ARISTATA Wall. Gya, Himis Shupka, Suru to Sirimarg.
CODONOPSIS OVATA Benth. Moolbeck, Kharbu.

COMPOSITAE

ASTER HETEROCHAETA C. B. Clarke. Common up to 17,000 ft. alt. and very variable.
ASTER TIBETICUS Hook. f. Common.
" ALTAICUS Willd.*† "Western Tibet" (FBI).
BRACHYACTIS UMBROSA Benth. Gya.
" ROBUSTA Benth. Leh. May be a large variety of *B. umbrosa*. The pappus is lighter colored than in Thomson's specimens.
ERIGERON ANDRYALOIDES Benth. Namika La, Fotu La.
" BELLIDIOIDES Benth.* Kangi (Meebold).
" ALPINUS UNIFLORUS Hook. f. Yarungshan La, Leh.
" MULTICAULIS Wall. (under *E. alpinus* L. in FBI.) Common, especially in the Suru region.
ERIGERON MULTIRADIATUS Benth. & Hook. f,† Zoji to Matayan.
BLUMEA BIFOLIATA DC.* Leh (Meebold).
FILAGO ARVENSIS L.* Dras (FBI).
GIFOLA GERMANICA (L.) Dumort.*
ANTENNARIA NANA Hook. f. & Thoms.* Nubra and Shayok Valleys, etc. (FBI).
LEONTOPODIUM ALPINUM Cass. Very abundant and beautiful in the alpine region.
ANAPHALIS NUBIGENA DC. Sapi La, Matayan to Dras, Lachalung, near Leh (Dr. Schmidt).

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† There is much confusion over the limits of the Himalayan asters and erigerons, as they seem to intergrade. A species of *Erigeron*, apparently undescribed, was collected at Baralacha Pass.

ANAPHALIS STOLICZKAI C. B. Clarke.* "Western Tibet," 5,000–10,000 ft. alt. (FBI). There is no part of Western Tibet as low as 5,000 ft. Hooker considers the species a state of *A. virgata*.

ANAPHALIS VIRGATA Thoms. Himis Shukpa, Sapi La, near Kargil.

" CONTORTA Hook. f.* Dras (Hend.).

GNAPHALIUM STEWARTII C. B. Clarke.* Karakorum (FBI).

INULA OBTUSIFOLIA Kern. Common in Ladak.

" FALCONERI Hook. f.* "Western Tibet" (Falconer), Skardu (Clarke).

" BARBATA Wall. Suru. My specimen seems to match *I. barbata* Wall., No. 2961, a species listed by Clarke (10) but not mentioned in FBI.

INULA RHIZOCEPHALOIDES C. B. Clarke. Sapi La.

" ROYLEANA DC.*† Kangi (Meebold).

CHRYSANTHEMUM TIBETICUM C. B. Clarke. Himis Shupka (specimens viscid), Khalotse to Yuru (specimens not viscid).

CHRYSANTHEMUM STOLICZKAI C. B. Clarke. Zoji-Matayan; much larger than Thomson's specimens.

CHRYSANTHEMUM RICHTERIA Benth. Namika La, Leh, Fotu La, Sapi La.

" INDICUM L.* Ladak (J.L.S.); cultivated.

TANACETUM FRUTICULOSUM Ledeb. Lachalung.

" ARTEMISIOIDES Sch. Bip. Shergol Dras, Sapi La.

" GRACILE Hook. f. & Thoms. Ladak.

" TOMENTOSUM DC.* (FBI, as *T. Senecionis* J. Gay.) Reported by Stewart as common. This is a more eastern plant and is probably a mistake.

TANACETUM NANUM C. B. Clarke.* Nubra Valley (FBI).

" TIBETICUM Hook. f. & Thoms.* Parang and Lanak Passes (FBI), East Kangi (Meebold).

TANACETUM LONGIFOLIUM Wall.* East Kangi (Meebold).

ALLARDIA GLABRA Decne. Khardong, Sapi La, Rusi La.

" VESTITA Hook. f. & Thoms.* Zanskar (FBI).

" NIVEA Hook. Sapi River; Khardong La.

" TOMENTOSA Decne. Rusi La, Baralacha.

" STOLICZKAI C. B. Clarke. Suru to Sirimarg.

ARTEMISIA SALSOLOIDES Willd. Sapi La.

" DRACUNCULUS L.* Ladak (Hend.), "Western Tibet" (FBI).

" DESERTORUM Spreng. Suru? "Western Tibet" (FBI).

" PARVIFLORA Buch.-Ham. Reported by J. L. Stewart but probably misnamed (not listed from Ladak in FBI).

ARTEMISIA SCOPARIA Waldst. & Kit. Leh.

" STRICTA Edgew. "Western Tibet" (FBI).

" MARITIMA L.* Ladak (FBI).

" TOURNEFORTIANA Reichb. Shergol.

" BIENNIS Willd. Leh (Meebold).

" LACINIATA Willd. Dras and Tankse Valleys (Hend.), Leh? (R.R.S.).

" SACRORUM Ledeb.* Ladak (J.L.S.), "Western Tibet" (FBI).

" MOORCROFTIANA Wall. Himis, Shupka.

" PERSICA Boiss. Dras; immature and possibly *A. maritima;* "Western Tibet" (FBI).

ARTEMISIA FALCONERI C. B. Clarke.* "Western Tibet" (FBI), probably from Skardo.

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† An undetermined species of *Inula* was found in the Barso Valley.

ARTEMISIA STRACHEYI Hook. f. & Thoms.* Rupshu and Lanak La (FBI).
" ABSINTHIUM L. Dras.
" MINOR Jacquem. Tsokar Lake, Lachalung La.
" SIVERSIANA Willd. Nyemo, Leh, Dras.
" MACROCEPHALA Jacquem.* "Western Tibet" (FBI).
" AMYGDALINA Decne.? Suru.
TUSSILAGO FARFARA L. Zoji, Khalotse to Yuru.
DORONICUM FALCONERI C. B. Clarke.* Karakorum (FBI).
SENECIO CHRYSANTHEMOIDES DC. Sapi La, Zoji to Matayan, Matayan to Dras.
" CORONOPIFOLIUS Desf.* Kangi (Meebold).
" PEDUNCULATUS Edgew. Common in Indus Valley, Ladak.
" DUBIUS Ledeb. Parang Pass (FBI).
" ARNICOIDES FRIGIDA Hook. f. "Dwarf Sunflower," one of the prettiest Ladak flowers; found in wet places.
SENECIO TIBETICUS Hook. f.* Karakorum (FBI).
CREMANTHODIUM DECAISNEI C. B. Clarke. Rusi La, Yarungshan La.
" OBLONGATUM C. B. Clarke.* Leh (Meebold).
WERNERIA NANA (Decne.) Benth. & Hook. f. (*Ligularia nana* Decne.). Rokshin, Lachalung. The involucre is cut more deeply than described.
WERNERIA NANA AFFINIS C. B. Clarke. Baralacha Pass. Involucral cup cut more than half way down, ligules many nerved and twice as long as the bracts, leaves toothed.
ECHINOPS CORNIGERUS DC. "Globe Thistle," dry hillsides in Ladak.
" NIVEUS Wall.* Dras (Hend.).
ARCTIUM LAPPA L. Near Suru.
COUSINIA FALCONERI Hook. Fotu La.
SAUSSUREA SCHULTZII Hook. f. Near Leh (specimens from Dr. Schmidt).
" BRACTEATA Decne. Lachalung.
" THOMSONI C. B. Clarke.* Nubra (FBI).
" SUBULATA C. B. Clarke.* Nubra (FBI).
" STOLICZKAI C. B. Clarke.* "Western Tibet" (FBI).
" TARAXIFOLIA Wall. Gya.
" FALCONERI Hook. f.* Karakorum (FBI).
" GRAMINIFOLIA Wall.* Ladak (FBI).
" GLANDULIGERA Sch.-Bip. Lachalung.
" ELLIPTICA C. B. Clarke.* Karakorum (FBI).
" JACEA C. B. Clarke. Barso Valley.
" ALBESCENS Hook. f. & Thoms. Suru.
" SOROCEPHALA Hook. f. & Thoms. Rusi La, Yarungshan La.
JURINEA CERATOCARPA Benth. Near Suru.
" CERATOCARPA DEPRESSA C. B. Clarke. Kharbu, Sapi La.
CARDUUS NUTANS L.* Ladak (Hend.), Nubra (FBI).
" THOMSONI Hook. f.* Ladak (FBI).
TRICHOLEPIS TIBETICA Hook. f. & Thoms.* "Western Tibet" (FBI).
CENTAUREA DEPRESSA Bieb. Moolbeck.
CNICUS WALLICHII PLATYLEPIS Hook. f.* Dras (FBI).
" ARVENSIS (L.) Hoffm. Kargil.
KOELPINIA LINEARIS Pall. Sapi La.
TRAGOPOGON PRATENSIS L. Sapi La? "Western Tibet" (FBI).

TRAGOPOGON PORRIFOLIUS L.* "Western Tibet" (FBI).

SCORZONERA DIVARICATA Turcz. Dras, Kargil, Himis, Namika La.

" PURPUREA L. Zoji to Matayan.

CHONDRILLA GRAMINEA Bieb. Karakorum (FBI).

TARAXACUM OFFICINALE Weber. Common, very variable and growing almost to the snow line. The Himalayan dandelions could be split up into species much more marked than Dahlstedt's European ones. Some are very hairy, some alpine specimens have white flowers, some are very dwarf.

TARAXACUM OFFICINALE PARVULUM (Walb.) Hook. f. Common.

" LEUCANTHUM Ledeb.* Kangi (Meebold).

SONCHUS ASPER (L.) Hill. Tralsi.

" OLERACEUS L. Saspola.

LACTUCA ORIENTALIS Boiss. Himis Shupka.

" SCARIOLA L. Suru? (R.R.S.), "Western Tibet" (FBI).

" SATIVA L.* Cultivated in Ladak (Hend.).

" UNDULATA Ledeb.* "Western Tibet" (FBI).

" LONGIFOLIA DC.* Common in Ladak (Hend.); possibly a mistake as Hooker (FBI) does not list the species from Ladak.

LACTUCA TATARICA C. A. Mey. Without definite locality (R.R.S.), Nubra, Hanle, etc. (FBI).

LACTUCA DECIPIENS C. B. Clarke. Suru to Sirimarg, Kharbu?

CREPIS FLEXUOSA Benth. & Hook. f. Himis Shupka.

" TENUIFOLIA Willd. Khalotse to Yuru.

" STOLICZKAI C. B. Clarke.* "Western Tibet" and Karakorum (FBI).

TABLE OF ALTITUDES†

Baralacha Pass	16,200 ft.	Rachogpa	13,400 ft.
Barso Valley, Suru	11,000	Rokshin	15,300
Dras	10,000	Rusi La	16,000
Fotu La‡	13,000	Sapi La	14,500
Gya	13,000	Saspola	9,700
Himis	11,000	Saspola Drokpo	11,000
Himis Shupka	11,000	Shergol	9,000
Kargil	8,700	Shishpur to Iljook	11,000
Khalotse	9,500	Spituk	10,500
Kharbu	11,000	Suru	11,000
Khardong La	17,600	Suru to Sirimarg	11,000 to 13,700
Lachalung La	16,600	Timisgam	11,000
Lamayuru	11,000	Tralse	11.000
Leh	11,500	Tsokar Lake	15,500
Matayan	10,500	Yarungshan	15,500
Moolbeck	9,000	Zoji La	11,300
Namika La	13,000	Zoji to Matayan	11,300 to 10,500
Nyemo	10,000		

† The plants were gathered very frequently between towns and so altitudes are only approximately correct as applied to the plants.

‡ "La" is Tibetan for Pass.

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INDEX TO AMERICAN BOTANICAL LITERATURE

1912-1916

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in the broadest sense.

Reviews, and papers that relate exclusively to forestry, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions, their kindness will be appreciated.

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